FOOD INDUSTRIES

DISTRIBUTION · PROCESSING

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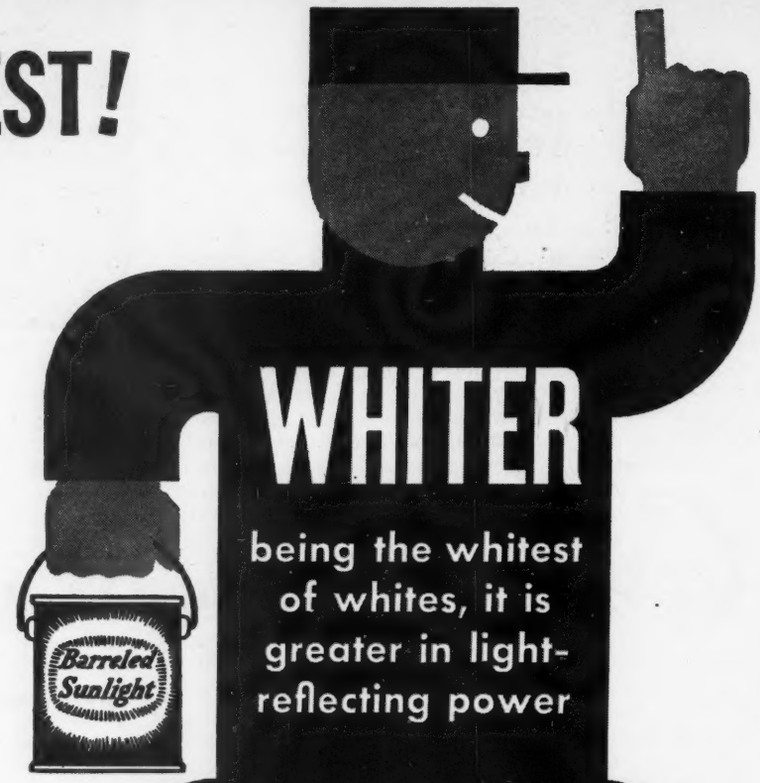

WHITER

being the whitest of whites, it is greater in light-reflecting power

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FOOD INDUSTRIES

DISTRIBUTION • PROCESSING

Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 9, No. 9

Laurence V. Burton, Editor

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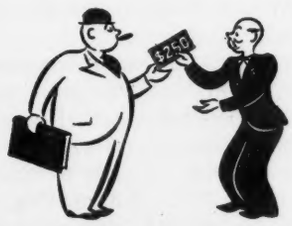
SEPTEMBER 1937

The Talk of the Industry

» JAMES ROOSEVELT, Administrative Assistant to the President of the United States, one time farm superintendent for the Roosevelt estate, ex-insurance broker, ex-president of National Grain Yeast Co., is to be chairman of the Sept. 21 luncheon session of the Ninth Boston Conference on Distribution. Make your luncheon reservation early.

» IT COST the Kraft-Phenix Cheese Company nearly $100,000 to defend itself against an unfounded charge of price discriminations in violation of the Robinson-Patman law. And now the Federal Trade Commission has decided it was all a mistake and has dropped the charge. If the government doesn't get your money by taxation, it can get it away from you by forcing you to pay it to the lawyers.



» EVIDENTLY there are several trusting souls among the food manufacturers of this country judging by the number who purchased the $250 Democratic Souvenir convention books.

» EVEN THOUGH for many years A. & P. has not owned any of the trucks that transport its goods from warehouses to retail stores, the company has had a very serious time of it with strikes in Philadelphia, which goes to show that farming out your trucking is not always a sure way to avoid a rumpus with organized labor.

» A NEW FOOD JOURNAL, *Revista Alimentar,* has made its debut in Brazil. This brings the world's technical periodicals on the subject of food processing up to five: two in England, two in the United States and the newcomer in Brazil.

Although it is written in Portugese some of the titles on the contents page look very interesting, such as: *"Conservação do leite no vacus,"* or *"Condiçoes a que deve obedecer o sel na industria de carnes e derivados."* (Stop us if this is not Portugese.) On turning to the text we find that these are digests from articles which have appeared in FOOD INDUSTRIES. Which goes to show that he who digests may in turn get digested.

» WHAT A RETAIL CHAIN STORE and a supermarket means, in terms that everybody can understand, has been related by Victor H. Lawn, who is preparing new anti-chain store legislation for the benefit of New York State independent retailers According to a published interview, every time a chain store opens up in a neighborhood four independent dealers have been put out of business. And every time a chain-owned supermarket opens up the chain closes up six of its own stores. So a supermarket must be equivalent to 24 independents, according to Mr. Lawn's calculations. Which, in a manner of speaking, is quite a store.

» AS IF there were not enough sugar production in the world, the province of Kuangtung in China has appropriated $2,500,000 for credit loans

to encourage small farmers to raise more sugar cane. And in the Western states of the United States we pay benefits to beet growers to keep them from producing too much but, of course, we pay it under the guise of soil erosion prevention.

» IF MR. MOHANDAS K. GANDHI of India (lately the Mahatma) is correct in his prediction that prohibition will return to the United States, there will be a fortune in it for the smart boys who work up a good book on home brewing, vinification and similar subjects. You may recall that books like Walter's "Essence Industry," which told how to make this and that were forcibly withdrawn from sale after 1921, and reissued only after the sinful chapters had been deleted.

» FLOUR MILLING seems to be getting back on a better earning basis if the recent annual statement

of General Mills is a fair index. They earned $4.46 per common share, net after taxes and preferred dividends, in the year ending May 31, 1937 as compared with $3.40 in the previous fiscal year.

Nevertheless there is a sour note in the statement, despite the reasonably good showing. Taxes, federal, state and local, amounted to $4.11 per common share in 1937; $2.75 per share in 1936; $2.58 per share in 1935; and $2.12 per share in 1934.

When a company has to pay out in taxes a sum as large as $4.11 per share it begins to savor of something more than the mere going price for existence. It would pay other companies to publish their taxes in this manner.

Ever Normal Granary

THE BIG TROUBLE with Secretary Wallace's ever normal granary plan is that, whenever there is a huge grain crop, all of the storage elevators ought to be empty, and whenever there is a very small crop, they should all be full. Just a little problem of guessing right on the future—that's all.

Time to Change the Milquetoast Attitude

ISN'T IT ABOUT TIME for industry to adopt a positive aggressive attitude in their public relations policies instead of a negative attitude?

In the welter of confused thinking extant in this country, with farmers very articulate, with labor vociferous and with consumers demanding lower prices and denouncing industrial inefficiency as the cause of high prices, what can industry gain by sitting quietly and turning the other cheek?

No industry is closer to the public than the food industry and none is receiving more adverse comment from an uninformed public. If Mr. Ford increases his prices there is no outraged public to be appeased, but let a baker, a dairyman, or any other manufacturer of the necessities of life add one cent to selling prices and the reaction is violent.

The time has come, if indeed it has not long passed, when the bald truth should be asserted. Disagreeable facts can be presented in a pleasant way as well as a disagreeable way. And being disagreeable is not always being truthful. Neither is being unctuously agreeable always honest.

To be specific, there have been some remarkable installations of new plants and new equipment in the past year. Some of them have been described in FOOD INDUSTRIES. Their purpose has been, not to increase production, but to decrease costs of operation.

Farmers demand more for their products, while the public demands a lowered selling price. Professional consumers cry for greater efficiency, claiming that both ends can be achieved at one and the same time if the companies are really efficient. When the pressure becomes great enough the manufacturer must comply. When he performs this seeming miracle, then is the time to tell the truth to the cockeyed world. The cost to the stockholders for compliance with such a demand is trivial compared to the cost which society must pay for very high corporate efficiency.

To be still more specific: we know of a new plant that was built solely for cutting down the spread between farmer and consumer where the true price of efficiency is the permanent loss of 400 jobs—not merely 400 men laid off but 400 jobs gone forever, never to be filled again! There will be 400 more candidates for relief just to comply with a political demand for higher efficiency.

The public must be informed that the public itself pays a greater price for politically-imposed job-slaughter than the poorly informed demagogue ever dreamed about.

One cannot ascribe such pressure to wilful or mischievous intent. It is

Hors d'Oeuvres

• The old Roman gourmets with their skylark-tongue and peacock-brain confections had nothing on modern cuisine connoisseurs. Canned rattlesnake meat has been on the market these past few years, and now there is introduced pulverized sea urchin packed in glass. To you landlubbers, a sea urchin is a spiny little animal shaped like a ball, with a flat side where the head looks out. Only the inside is edible, and after they have been dehydrated and pulverized it takes 45 urchins to cover a handful of crackers.

• *Abraham Lincoln failed as a grocery operator, but he apparently learned enough about people in his six years in that business to know how to get popular support. Which is more than some modern food executives learn in a lifetime.*

• There is strong reason to believe, we are told, that the spicy variety of sausage known as salami originated in the city of Salamis on the east coast of Cyprus, a town so ancient that it ceased to exist in 449 B.C. So you can't put the blame on the Italians after all.

• *Harold L. Ickes in a statement on the sugar-legislation squabble said: "Let it be reiterated that the entire Administration is solidly against the efforts of a small but active group of manufacturing monopolists to entrench themselves further at the expense of the American people." Manufacturers have long been solidly against efforts of the Administration to entrench itself further at the expense of the people. Which makes everybody even.*

• Lanital, which is the name for the artificial wool made from skimmed milk, is to be manufactured in the Netherlands. We trust the Dutch dairymen won't pull the wool over the people's eyes.

• *An orange grower in Alice, Texas, reports that he has successfully ripened citrus fruit by burying it in the ground. Not to belittle, we say that "ain't" nothing. For years and years they've been ripening cheese in Scandinavia by burying it in dung heaps.*

• If the early glass containers had been resistant to heat shock, perhaps the tin can never would have come into existence. Peter Durand, an Englishman, became so exasperated by bottle breakage while trying to preserve food by the new Appert process that he said "Damn." And when an Englishman says "Damn" he goes off the air. But radio being yet unborn, Durand went to a tinsmith and had himself a tin can made.

• *A remedy for unscientific eating on the part of the masses is said to lie in the substitution of community feeding for the family kitchen. Which moves us to this prayer:*

Give us community recreation, education, art or music.

Give us community baths, lounge rooms or solariums.

Yea, give us—even unto community bedrooms.

But let us keep our own kitchen wherein we may satisfy the soul that longs for individual creations in the art of cuisine concoction.

only attributable to ignorance. The only antidote for ignorance is the truth—the cold, bald facts. It is high time for manufacturers to tell the public what it's all about.

The Price of Fixing Wages and Hours

No sooner is the Supreme Court monkey-business out of the way than the nation faces the wages-and-hours legislation. Sponsored by idealists, those who look only at the credit side of the ledger believe it is a worthy cause. Yet all must remember that there is a debit side, as well. And all must remember that there is none so ruthless as an idealist: To the dyed-in-the-wool idealist, the end always justifies the means. He would wreck, even the livelihoods of millions, if need be, to achieve his fanatical aims.

Experience, long and bitter, teaches the open mind that it is possible to have many industrial jobs at moderate wages or it is possible to have fewer jobs at high wages and short hours with the aid of greatly more mechanized operations. But it is not possible to have both—not as long as the consuming or purchasing public has the option of buying or refusing to buy the products of industry.

While admitting that economic society is still imperfect, and probably always will be, there is no surer way to cut down the number of industrial jobs and to perpetuate the need of wholesale relief than to fix wages and hours even by the aid of a commission with considerable latitude of powers.

Nobody who has the true welfare of all of the people at heart and who at the same time really understands the complexities of American business will favor the rigid restrictions which wages-and-hours regulation will impose.

Those who argue in favor of federal fixing of wages and hours seem to believe that the higher costs will be paid by magic, as if corporation executives were magicians. But there is no magic in good management. If costs cannot be passed along to buyers then the enterprise must soon go out of business. Hence the price of fixed high wages and short hours cannot be paid by industry itself longer than its reserves or credit will permit. Consequently, the idealists will exact the fearful price of increased unemployment from the very persons who are least able to cope with life.

Drought Frequency Maps Useful

Locating a factory in some branches of the food business involves many important factors other than labor supply, transportation, nearness to markets. Of the other factors, none is more important than the ability of nearby farm lands to produce the needed crops of raw materials. Adequate rainfall is naturally very important for crop production.

It has been discovered that drought-frequency maps from the Weather Bureau deserve consultation in this work, for frequently there is a surprisingly sharp line of demarcation between areas that are chronically dry and other areas only a very few miles away that have plenty of rain.

No satisfactory explanation for this differentiation of rainfall has ever been given, but the weather records will often be helpful in determining the best location from the crop angle, or in what territories to contract acreage.

The Sugar Mess

Anyone who would understand the proposed sugar control program under active consideration at the time of writing must devote his entire time to the subject. Books have been printed on it. Huge reports and analyses have been broadcast in mimeographed form. Various opposing factions have even undertaken to give this department a bit of personal instruction. And, we regret to relate, some of it has come by telephone from persons we could not possibly identify.

Food Industries has been urged to take a vigorous stand for each of several different—even opposing—points of view. (Evidently we have a very potent influence.)

Unfortunately, however, we are feeling so far from all-wise, ourselves, that an intelligent attitude is well nigh impossible. To strike an attitude on strictly economic grounds, or give way to our prejudices, or to take an arbitrary, dictatorial stand would not be difficult—no more difficult than to flip a coin or draw a slip from a hat.

Politics unfortunately also enters the sugary field of contention—both regional or domestic politics and international politics. The Secretary of State, with his power of commercial treaty-making without the further aid or consent of the Senate, has committed the United States to a course of economic action in Cuba and certain other countries which have important sugar production. Congress has seen fit to grant recent benefits to domestic sugar-crop growers, as well as to allow curious small inconsistencies between the duties on raw and refined sugar to exist in the tariff law. Also sugar quota systems have been created and have been operative for some time.

Now that everyone has a vested interest in various inconsistent or antagonistic arrangements, a beautiful mess has developed for which there is no happy solution. No matter what is done, somebody is going to be hurt and will, of course, be vindictive. One can sympathize with Mr. Cordell Hull, who says that unless international trade is restored within two years, the inevitable result will be warfare on a huge scale. One can sympathize with the beet farmers, the beet sugar refiners, the domestic cane sugar growers, and the cane sugar refiners, as well as those who have investments beyond continental United States. Each can put up a very plausible argument for his desired quota, his benefits, or his idea of the right tariff.

To make a logical, clean-cut decision on what ought to be done on the sugar problem alone requires a greater philosophic ability than we possess.

Out of the welter of confusion we can reach only one conclusion: the basic causes of the controversy must be eliminated if the problem is to be settled in a way that will stay settled, and we are not even sure that that is possible. Two secondary thoughts also intrude themselves:

1. As a matter of good organization and control, it is a fundamental error to have a situation where there exists two independent treaty making agencies. The Secretary of State can make certain trade treaties independent of the Senate, which also makes treaties. Despite the peaceful idealism of Mr. Hull, we believe a large cargo of domestic trouble originates in the reciprocal tariff act of 1934.

2. As a matter of sound economic principle, it also appears unwise to pay benefits to farmers for *not* producing crops even when under the guise of soil conservation.

A final thought in our lugubrious contemplation of the increasing problems ahead of us is that the cost of sugar must inevitably be increased by restrictions and benefits to producers.

As they used to say in 1921, sugar will never be as sweet again.

STORAGE METHODS
That Need Improvement

Dried fruit industry can cut losses by using fumigation, air conditioning and handling methods that reduce damage

By WALTER S. RICHERT
Consultant on Dried Fruits, Berkeley, Calif.

STORAGE is probably the most important single operation in the dried fruit industry. No factor in handling dried fruit has a greater effect on quality. Every piece of dried fruit must remain in storage for a period of time ranging from one or two weeks to as much as a year or more, and during this storage certain permanent changes take place in the fruit. Changes that take place in dried fruit quality through any other operation may be controlled by adopting suitable precautionary measures; but changes occurring during the storage period are permanent, and no subsequent treatment will restore the fruit to its original condition.

Many food products are placed in storage for varying lengths of time to improve their quality in one way or another, as, for example, the aging process for cheese and liquors. In dried fruits, however, changes taking place during storage invariably result in the deterioration of the fruit.

Methods of dried fruit storage have undergone no appreciable change in the past 20 or 30 years. No advantage has yet been taken of the scientific and technological advances made in those decades. While other industries have advanced, the dried fruit industry in this instance has stood still.

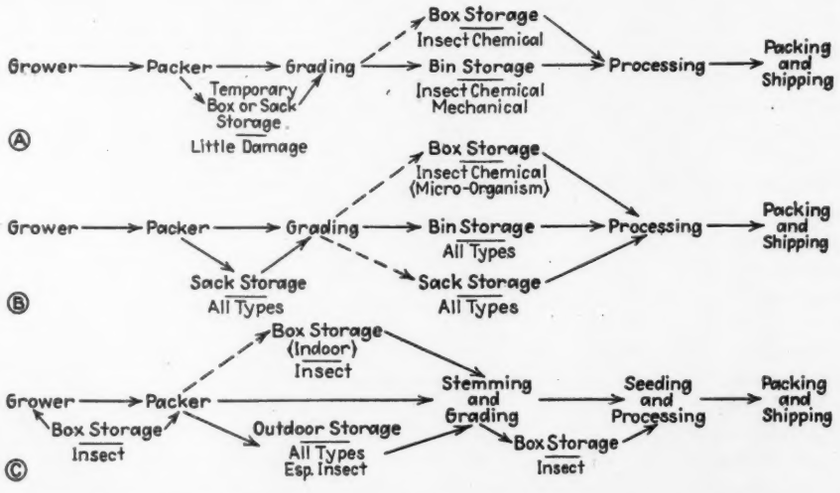
As currently practised, four types of storage are used, and the particular method employed varies with the type of fruit, its quality, and convenience of handling. These methods are bin, sack, box and outdoor storage.

Dried fruits may, in general, be divided into two classes: "cut" fruits, and whole fruit. Cut fruits, as the name implies, are those which have been halved or otherwise cut before drying, such as apricots, peaches, and pears. These fruits are always treated with sulphur dioxide for the purpose of retaining the color and other desirable qualities of the fruit. The whole fruits, of which prunes and raisins are examples, are dried whole without the use of sulphur dioxide. They have naturally dark skins, so that preservation of their color is of little technical concern. Classification of fruit for quality is based primarily upon size. The larger sizes are generally riper, tastier, more meaty, and more appealing to the eye, and so have a correspondingly higher market value.

With the exception of raisins and apples, the principal method of storing all dried fruits is in bins. The size of the bin is approximately 8x12 ft. and fruit is stacked in it to a depth of from 5 to 10 ft. Bins are constructed with open tops and a collapsible front wall. The fruit is dumped in from the top, immediately after grading for size and quality. The storage period lasts until an order is received for a shipment of that particular lot of fruit. The front wall is then taken down and the fruit is removed with a pick and shovel, and transferred to the processing department in a wheelbarrow or hand-operated box truck.

The first advantage of bin storage is the large size and relatively economical construction of the bin. Of almost equal importance is the fact that its use permits complete blending of the fruit. Fruit produced in different localities and under varying conditions must be intimately mixed to give uniform quality throughout the year. Bin storage is never used for ungraded fruit.

Although bins are generally designed to hold almost the entire capacity of the plant, at times there is more fruit on hand than can be stored in them alone. To hold this



A—Flow diagram for cut fruits, showing damage in storage. B—Flow diagram for prunes, showing damage in storage. C—Flow diagrams for raisins, showing damage in storage.

excess fruit, either wooden boxes or burlap sacks are employed.

Sacks are at times used for the storage of all fruits, again with the exception of raisins. The sacks, each containing about 100 lb. of fruit, are stacked 5 or 6 high on the warehouse floor. In times of emergency when space is particularly scarce, they may be stacked as high as 20 deep for short periods of time.

Storage in sacks is used chiefly for the defective and off-grades of fruit since there is generally not enough of this fruit to warrant the use of the large bin.

Grower deliveries of fruit will at times be made in sacks, or incoming fruit may be placed in sacks through a shortage of boxes; this fruit may remain stored in sacks for some time, pending grading and subsequent binning. Graded fruit also may be stored in sacks because of a shortage of bin space.

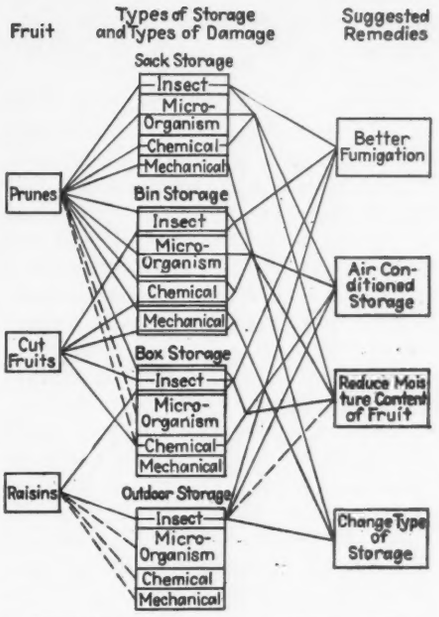
The advantages of sack storage are the limited equipment needed, and the comparative mobility of the fruit. Also, under present conditions, fumigation is most easily accomplished with fruit stored in small stacks, as is the case with the sacks.

A relatively small proportion of fruits, chiefly the most tender, are stored in wooden boxes. The greater proportion of box storage, however, is with fruit that has been delivered by growers, but which has not yet been graded; after grading, bin or sack storage is generally employed. The better grades of apples are invariably stored in boxes, this being necessitated by the especially delicate nature of this product. Raisins are always stored in boxes, but the special methods used for this fruit will be discussed under the next type of storage. Box storage is also used for small lots of fruits, particularly if this fruit is to be processed and packed in the near future. Some of the better grades of fruit, being more tender and more valuable, are protected from damage by storage in boxes.

STORAGE IN BOXES is by far the most satisfactory of all. It makes possible handling in small lots, easy arrangement for fumigation, and better segration of the fruit. All types of deterioration during storage are more easily controlled by this storage method. Unfortunately, the relatively high cost of equipment makes it the most expensive method of storage and, as a result, it is used much less than it should be.

Outdoor storage is the storage of fruit in the open, under only a temporary cover. It is used almost exclusively for raisins and, unfortunately, for this fruit it is used almost universally.

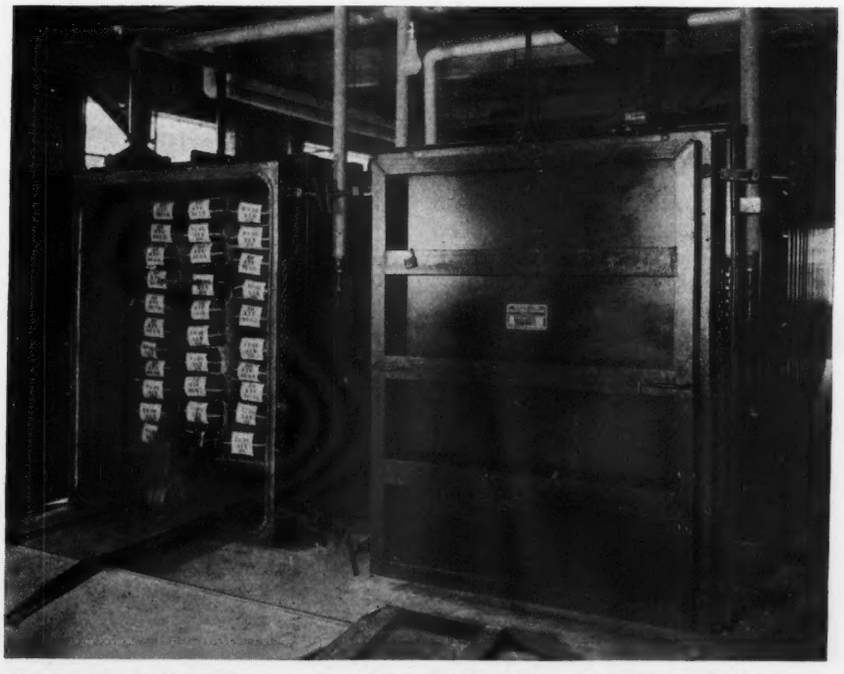
Altogether there are only three varieties of grapes grown to any extent for drying purposes. All of these are grown in the same locality and under almost identical conditions, making blending or extended segregation of the fruit unnecesary. As a result, the grading and blending of large quantities of fruit is not practised, and considerable quantities of the fruit are stored for extended periods of time without grading. The raisin crop amounts to approximately 200,000 tons annually, and all of this is handled in the Fresno district of California alone. Rather than provide a permanent warehouse for the large quantity that is grown, the practice has arisen of storing it in large stacks of boxes with a temporary cover, which is generally made of sheet iron.



Remedies suggested for various conditions damaging dried fruits during storage.

Raisins are the most tender and easily damaged of all dried fruits, so they are always stored in boxes. Because of this fact, and because of the large quantities that are grown, a special box has been developed for their use, the "sweat box". This box is 27x38 in. in area, and only 8 in. deep. It holds about 200 lb.

After being received from the growers in these boxes, a sufficient quantity of raisins is graded, and the rest stored until they are needed. Storage may take place in the immediate vicinity of the plant or at various receiving stations situated nearer to the growers who produce them. Some are stored in permanent warehouses, some in semi-warehouses (open sheds with permanent roofs), but the greater portion is stored by stacking these boxes one upon the other to a height as great as 30 ft. After grading, raisins are generally stored in smaller boxes, usually in



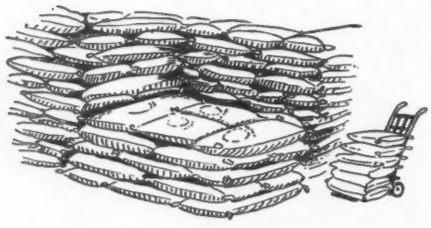
Vacuum fumigation units, recommended in this article as a means of eliminating trouble from insect infestation in the storage of dried fruits.

permanent warehouses or semi-warehouses, until they are needed for shipment.

Outdoor storage is by far the least satisfactory of any method. It leaves the fruit open to all possible forms of infestation and deterioration. Its chief advantage lies in its presumed economy, although this presumption may prove invalid after handling costs have been taken into consideration. One other advantage is that these stacks are relatively well ventilated, which helps to maintain the quality of the fruit.

Dried fruit is subject to four types of deterioration during the storage period. These are damage through the attack of insects, through the action of micro-organisms, through chemical change, and mechanical damage caused by the handling of the fruit.

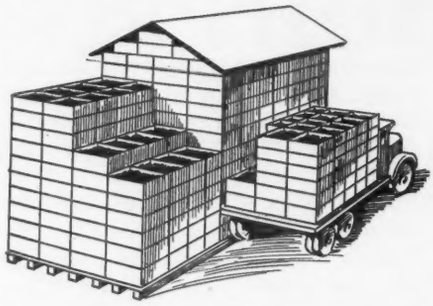
The greatest technical problem facing the dried fruit industry today is the control of insect pests. Losses



Sack storage is mostly used for intermediate purposes.

to the packer result not only from the weight of fruit actually eaten by insects, but also damage to other pieces of fruit only partially consumed. Because of stringent and rigidly-enforced governmental regulations, the action of insects does not affect the quality of the fruit reaching the consumer; but the cost to the packer of segregating and disposing of this damaged fruit is enormous. All fruit before packing passes over a sorting belt where damaged fruit is removed. Fruit that has been damaged by insects or otherwise is eliminated by this operation, and must be disposed of by the packer in other channels than as food for human consumption.

Complete control of the action of insects is impossible under present conditions of storage. Fumigation of an entire plant, as practised by some industries, is not possible because of the difficulty of making any of the dried fruit plants air-tight. Researches in methods of fumigation have made it possible to fumigate



Outdoor storage is commonly, but improperly, used for raisins.

stacks of fruit, such as in box or sack storage. Fumigation of bins is impossible, as they cannot be made air-tight because of the manner of their construction. Fumigation of fruit held in outdoor storage is entirely out of the question. Damage to dried fruit could be reduced by fumigation before placing the fruit in storage, but this is not generally practised. Even if such pre-storage fumigation were adopted, the fruit would always be subject to the danger of subsequent re-infestation. It has been conservatively estimated that losses to packers of dried fruit through the action of insects amounts to more than half a million dollars each year.

The significance to the dried fruit industry of the action of micro-organisms has only recently been discovered. Some peculiar happenings, such as the musty odor and rise in temperature of an occasional bin of prunes, had often been noticed but little attention had ever been paid to them. The greatest source of damage is the growth of yeasts, but molds and possibly bacteria also exert their deleterious influence. Cut fruits, since they contain sulphur dioxide, suffer little from the action of these organisms. Whole fruits, however, and particularly prunes, suffer losses from them the magnitude of which is not even suspected by the handlers of the fruit.

IT IS PROBABLE that every lot of prunes that has ever been handled by the industry has suffered to some extent through the action of yeasts. In some instances losses of sugar as great as 10 per cent of the original weight of the fruit have been observed. These organisms are killed in the processing treatment, as is evidenced by their sterile condition months later; but the losses that are occasioned before packing are tremendous.

The annual crop of dried whole fruits lies between four and five hundred thousand tons. About 1 per cent of the weight of this fruit is lost through the action of molds and yeasts, as a conservative estimate.

Deterioration of these dried fruits through chemical changes affects whole and cut fruits in entirely different ways.

Cut fruits, in storage, will lose their original bright colors and become drab, discolored, and darkened. Coincident with this loss of color and roughly proportional to it is a decrease, presumably through oxidation, of the sulphur dioxide content of the fruit. However, the darkening does not occur until this sulphur dioxide content decreases below a critical value that is dependent on maturity, moisture content, composition, and previous treatment of the fruit. The action of sulphur dioxide in preserving color is probably due to its anti-oxidant nature.

In whole fruits, objectionable chemical deterioration is manifested largely by the "sugaring," or formation of crystals of sugar, on the skin of the fruit. Prunes in particular are affected by this phenomenon, but raisins and other fruits also experience it to a lesser degree. Sugaring of fruit damages it in two ways. This external sugar is washed off and lost in processing the fruit, resulting in a loss of weight of the final product equivalent to the weight of the sugar. Also, the quality of the fruit is reduced because of reduction in its sugar content. In some cases this coating of sugar on prunes taken from storage has been found to amount to as much as 5 per cent of the weight of the fruit.

There is some evidence that yeasts have some effect upon the sugaring of prunes, but this has not yet been ascertained with certainty.

Mechanical damage to dried fruit results entirely from improper handling. Some of this damage is unavoidable, but the greater proportion could easily be eliminated. The type of storage most conducive to this damage is binning of the fruit. It is avoided almost entirely by box storage.

Mechanical damage is caused by pressure of the fruit in the bins and by the improper removal of fruit from these bins. When fruit is stored to a depth of 8 ft., there is exerted a pressure of approximately 350 lb. per sq. ft. on the lower layers. This pressure is sufficient to cause a heavy syrup to exude from the more tender fruit. This syruping causes damage both by loss in weight, and by a cor-

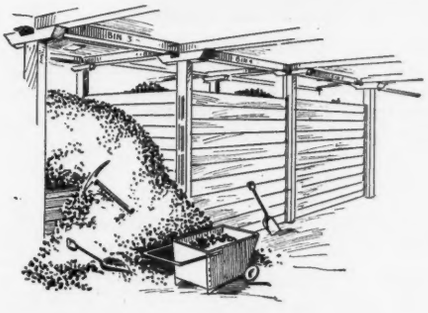
responding reduction in the quality of the fruit.

In removing fruit from bins, the entire front wall of the bin is first dismantled. The solidly packed fruit is then removed with a pick and shovel. Every time the pick enters the mass of fruit several pieces are damaged. This damaged fruit has no appreciable value, and must be removed by the expensive hand-sorting method.

Although mechanical damage is less significant than insect infestation and other forms of damage, it is important and by the use of proper methods could be avoided entirely.

The principal factor affecting the various types of damage is the moisture content of the fruit. Under present conditions, fruit is received from growers with a moisture content ranging from 16 to 22 per cent. During the storage period this moisture content gradually drops to about 15 per cent, but most of the damage has been done long before this low moisture content is reached.

Insects attacking dried fruit thrive best when the moisture content is around 18 per cent. Very few will live in fruit with moisture content lower than 12 per cent. Micro-organ-



Typical bin storage for dried fruit.

isms prefer fruit with a moisture content as high as possible, but they also cannot grow to any appreciable extent in fruit with a moisture content of 12 per cent or less.

Although there is no lower limit to the moisture content of dried fruit at which chemical changes cease, a moisture content of 10 per cent will reduce this type of damage to almost negligible proportions.

The temperature of the storage chambers is also of considerable importance in affecting the deterioration of fruit in storage. The action of all living organisms is increased with rise in temperature, and can likewise be almost completely eliminated by a moderate reduction of temperature, to about 45 deg. F.

It is a generally accepted rule in chemistry that an increase in temperature of 18 deg. F. will approximately double the rate of chemical reaction. This rule has been found to hold quite well in the changes of color in cut fruits. At a temperature of 100 deg. F. dried fruits will lose their color to the point of commercial unsalability within about two months. As the temperature of storage is reduced, the rate of loss of color is decreased proportionately, until at temperatures of from 40 to 50 deg. F., the reactions involved are stopped almost completely.

Although the subject has not been fully investigated, there is definite evidence to indicate that the humidity of the air of the storage chamber also has an effect upon the chemical deterioration of the fruit. The effect of light and of ventilation must also be investigated more thoroughly before the best conditions of storage can be prescribed with finality.

ANY METHODS or conditions for storage of dried fruit must take into consideration these various factors causing deterioration of fruit in storage, and must seek to avoid them as completely as possible. Any proposed methods of storage must also be economically justifiable through the savings they will effect for the packer. The losses occasioned by the various types of deterioration are of such magnitude that they would, within a few years' time, more than pay for the cost of any additional equipment necessary to effect any of the proposed changes hereafter listed.

The moisture content of the fruit has been seen to be the greatest factor affecting deterioration in storage. Accordingly, the most efficient method of avoiding storage losses is to reduce this moisture content. The obvious method of doing this would be to induce the grower to dry his fruit to the greatest possible extent; a satisfactory inducement might be a bonus for the drier fruit, and a penalty for that which is not dry enough. In addition, all fruit should be dried to a moisture content of not more than 15 per cent, and preferably to only about 12 per cent, immediately upon receipt.

To prevent losses through various causes at higher temperatures, the fruit must be stored at reduced temperatures: 45 deg. F. is sufficiently low to prevent most forms of deterioration. Not only the temperature, but the humidity of the air should be controlled as well. Every plant for dried fruit should be completely air-conditioned, and the temperature and humidity maintained at those conditions experimentally found to be best.

A great defect of present storage conditions is the impossibility of absolute control of insects. Any storage system should provide means of fumigating any lot of fruit at any time. The only practical means of achieving this is to have the storage space constructed so that it can be made air-tight. Fruit could then be fumigated at any time, and the room kept insect-proof until fruit is required to fill orders.

As a further check against insects, all fruit should be fumigated immediately upon entering the plant. This may be done in a sealed fumigating chamber, but "vacuum fumigation" is far more satisfactory. In fumigating, it is desirable to kill micro-organisms as well as insects. The only possible means of killing yeasts and molds other than by the use of heat is to place them in a sealed chamber, reduce the pressure, and then expose them to the proper fumigant for a sufficient length of time. Vacuum fumigation is much quicker than any other type. It will kill all insects as well as kill the spores of molds and yeasts.

If mechanical damage is to be avoided, the most practical type of storage is in boxes. The size of the box is of little importance, being determined by convenience in handling in each particular plant. A plant handling considerable quantities of fruit might use one with a volume of about 23 cu.ft. Such a box would be a convenient unit as it would hold just about 1,000 lb. of fruit. These boxes could be transported by electric trucks, and could be placed one upon another in storage. By using mechanical power rather than human labor, appreciable savings in handling costs would be effected.

NOTE: *In a later article, Mr. Richert will give additional information about means of maintaining and improving the quality of dried fruit.—Editor.*

Box storage, indoors, is the best method.

MATURITY TEST for PEAS

Editorial interpretation of method proposed

By S. L. JODIDI*

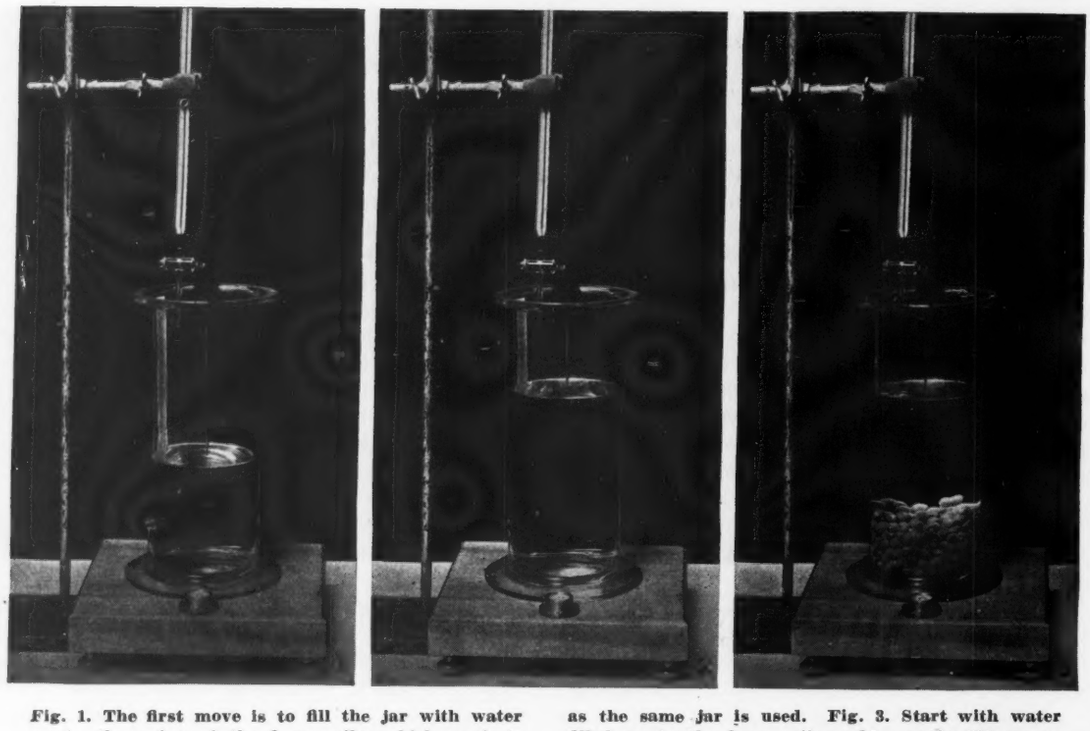


Fig. 1. The first move is to fill the jar with water up to the point of the long spike which projects downward. Fig. 2. The exact amount of additional water needed to fill the jar to the point of the short spike is determined once and for all time as long as the same jar is used. Fig. 3. Start with water filled up to the long spike, add exactly 500 grams of peas without spattering the water. Then measure into the jar enough more water to barely touch the short spike. Now calculate the specific gravity.

YOUNG UNRIPE PEAS of high sugar and low starch content are easily distinguishable from peas at the other extreme of quality, where the ratio of starch to sugar is much higher. But between the two extremes there are many gradations of maturity or quality, the exact measurement of which has been slow and tedious. Palatableness and flavor, as well as tenderness, change rapidly as the peas grow older.

Prompt measurement of the extent of the change has the possibility of playing an important part in gaging the time of harvesting the crop for either canning, freezing or for sale as market produce. Also the time may come when the purchase of raw material will be based on quality standards. Then, the method of testing must be very rapid.

In the past, various maturity tests have been proposed as a guide to harvesting and canning schedules. Size, puncture tests, crushing tests, and various chemical methods have been used. Many of these earlier procedures required too great skill or judgment on the part of the operator to be useful. Others, of real significance and dependability, required much too long a time to be useful in practice. The effort of the Bureau of Plant Industry has been, therefore, to establish a new procedure of reasonable accuracy and dependability which could be carried out quickly in the field.

The new "maturity test" devised by Dr. Jodidi is based on the measurement of specific gravity of peas. This procedure in its extremely simple form requires from fifteen to twenty minutes for a test, as compared to two to three days by old, equally accurate, chemical methods. "So accurate is it that duplicate maturity tests agree within a few hundredths of 1 per cent as compared with the standard methods whose duplicates deviate from each other 1 to 5 per cent and more; so simple is the maturity test that its handling requires no technical training or experience."

The essential novelty of the new method lies in the simplification of equipment used plus a new method

New Method of Measuring Specific Gravity

While this method of testing has been developed primarily to determine the maturity of the raw material for pea canners, it has an interest for all who need a simple, rapid and accurate method of determining the specific gravity of insoluble solid materials for purposes of Quality Control

** This presentation is based primarily on the article published in the May issue of Journal of the Franklin Institute, by S. L. Jodidi, physiologist, Bureau of Plant Industry, U.S. Department of Agriculture.*

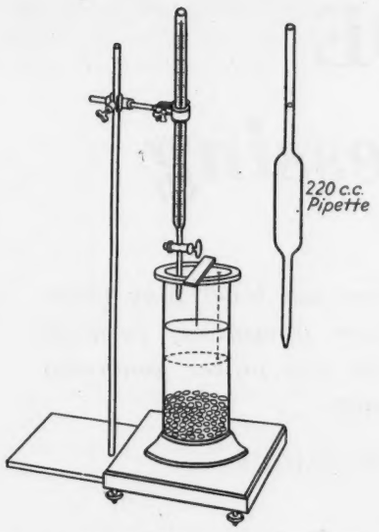


Fig. 4. In addition to this equipment there is needed an accurate scale or balance on which to weigh the peas.

of reading the miniscus of a liquid. A cylinder, carefully calibrated, is accurately leveled, then filled to a lower mark with water. A sample of 500 grams of peas is added and additional water is introduced from a pipette and burette until the water level reaches an upper level marker. By an ingenious device, using two sharp tipped rods which can be easily placed accurately in the cylinder, the lower and upper levels of liquid are precisely fixed. It is then necessary for calculation only to know the weight of the peas used and the volume of water necessary to lift the level from lower to upper fixed points. The method of calculation is indicated below.

It will be noted by those who have had industrial experience with specific gravity separation of old and tender peas that this method does not contemplate any prior blanching to remove the gases from the peas. There are some technologists who may regard this lack of "degassing" as a defect. Yet the published data show progressive changes in specific gravity.

The method proposed is the subject of a United States patent application by Dr. Jodidi. This procedure will, however, be made available to any interested person, as use of the patent is to be dedicated to the public without charge. The accompanying sketch shows the apparatus diagramatically. The following paragraphs give Dr. Jodidi's own published description of procedure and calculation.

"The actual estimation of the specific gravity of peas is made as follows: The cylinder adjusted to stand vertically on a leveling board, receives rapidly the entire volume of water from a pipette having the capacity of 1,030 cubic centimeters. This is followed by careful addition of water from a burette until the water surface just contacts the needle-sharp tip of the long rod, which is now removed. Next 500 grams of peas, weighed out in a counterpoised copper beaker, are at once transferred to the cylinder so as to avoid spattering. Now the short rod is placed on the cylinder and 220 cubic centimeters of water is added by means of a pipette, followed by careful addition of water from a burette (say 1.3 cc.) until the needle-fine rod tip just reaches the water surface. So delicate is the manipulation that a final *single* drop of water added to the cylinder is sufficient to effect that contact. The test is now completed.

"On subtracting the volume of water added (220 cc. + 1.3 cc.) from the volume between the tips of the two measuring rods (714.4 cc.) there is obtained 493.1 cubic centimeters which represents the volume occupied by 500 grams of peas. Hence 500 ÷ 493.1 or 1.0140 is the specific gravity of the pea sample. This simple calculation may be rendered superfluous by the preparation of a table which gives the specific gravities corresponding to the volumes occupied by the peas."

The extended research of Dr. Jodidi has demonstrated that the specific gravity of raw green peas changes with change in sugar-starch ratio. Data published in the article already cited and many additional unpublished results obtained by the Bureau clearly show that change in specific gravity of a given variety of peas under any one set of soil and climatic conditions indicates the maturity, or quality. The higher the specific gravity of the peas the poorer is their quality. Interpretation in the field of test results is, therefore, very simple.

No absolute figures can be given, as different varieties of peas, or even a single variety grown under different soil and climatic conditions, will not have a constant relationship between specific gravity and maturity. But the test is so simple that it is readily applied as a gage or guide to changing maturity. It can be used, for example, to compare the maturity of peas in one field or one portion of the field with the maturity of those in another nearby. And with a given variety of peas, maturity development can be followed closely by a series of tests made from day to day.

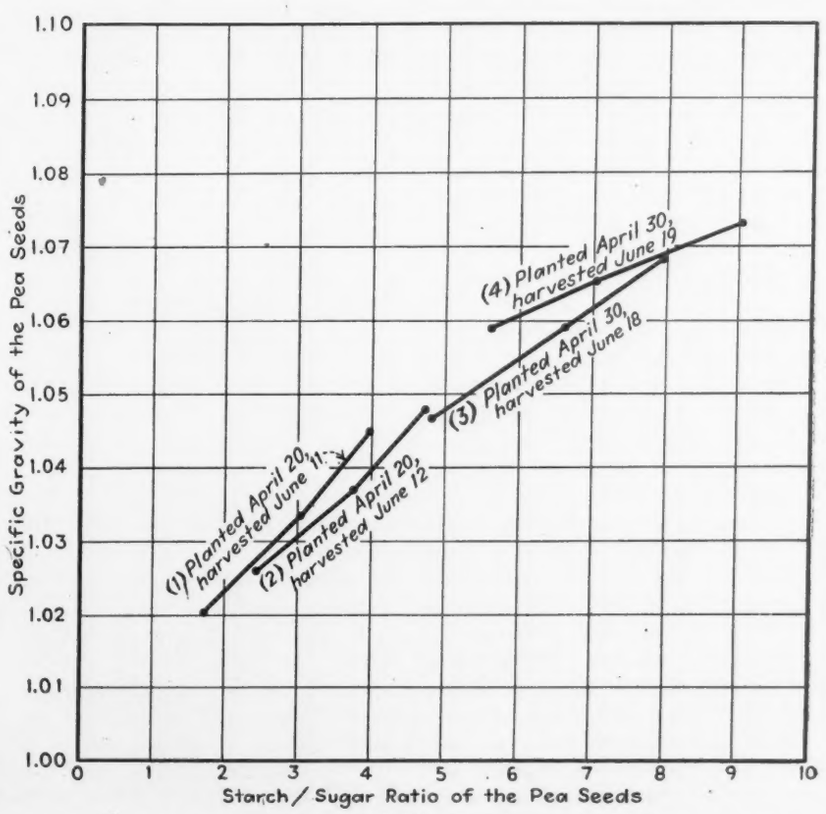


Fig. 5. Data plotted here show how the specific gravity of unblanched peas changes with changing starch-sugar ratio.

How ALTITUDE *Affects Food Processing*

Variations in the height above sea level may cause trouble in retort or sterilizer operation, formula balance, cooking temperatures and power generator performance.

By MARK A. BARMORE
Agricultural Experiment Station
Colorado State College, Fort Collins, Colo.

▶ ***With the rapid extension of food processing into the mountain regions of the west and into the higher regions of the Appalachian system in the Carolinas and Tennessee, the findings of the investigations made at Fort Collins into the effect of altitude, are of increasing importance to***

All Food Manufacturers

SOONER OR LATER we all learn that altitude changes cause pressure gages to read incorrectly and that they slow down or speed up the rate of water evaporation.

Airplane travelers find that thermos bottles spout out their contents upon opening if filled with boiling hot liquids before taking up.

But how many of us realize that altitude changes give rise to serious problems in the baking of all types of products, especially in the baking of cakes? Also that altitude affects nearly all types of power generators whether they be steam or gasoline boilers, diesel engines, electric motors or electricity generators?

Perhaps the most widely recognized effect of high altitudes is the decrease in the temperature at which water boils. This effect extends to the boiling points of all types of solutions. At high altitudes sugar solutions used in the making of candies, syrups, jellies and icings boil at lower temperatures than at low altitudes. A reduction of 1.88 deg. F. for each 1,000 ft. of altitude is a good approximation. However, the correction changes slightly for different strength sugar solutions and for different altitudes.

The common types of pressure gages are designed to register the difference between the pressure in the vessel to which they are attached and the pressure surrounding the gages. In most instances in food processing these gages are used to measure steam pressure in an autoclave or sterilizer and in these instances they are used to indicate the temperature, which is after all the really important factor. But temperature is dependent on the *total* or *absolute* pressure in a closed vessel. This absolute pressure is the sum of the gage reading and the atmospheric pressure. Therefore a gage reading at sea level does not indicate the same temperature as at a higher altitude.

At sea level a food product ordinarily sterilized at 15 lb. steam pressure would be subjected to a temperature of 250 deg. F. If the same process is carried out at 5,000 ft. the temperature will be 245 deg. F. While this difference is not much, it may be important. The correct thing to do is to process at the temperature indicated by a reliable thermometer which will require carrying out the sterilization at 17.5 lb. gage pressure at the 5,000-ft. altitude. It is necessary to increase the gage reading by ½ lb. for each 1,000 ft. altitude. Proper sterilization becomes increasingly more important at high altitudes in view of the evidence which seems to show that the organism causing botulism poisoning is more abundant in the soils of the Rocky Mountain region.

Vacuum measured as inches of mercury is also in error at high altitudes unless corrected. At sea level 28 in. of vacuum is the same as 23 in. at 5,000 ft. The boiling point of the solution and the rate of evaporation will be the same in these two cases. The correction in this case is almost exactly 1 in. for each 1,000 ft. of altitude.

The following table illustrates

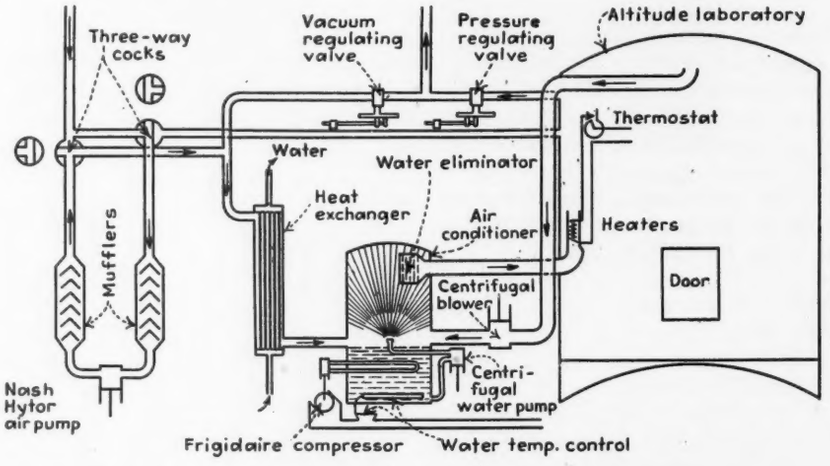


Fig. 1. Schematic drawing of "Altitude Laboratory" and equipment.

how the air or atmospheric pressure, the highest possible vacuum obtainable, and the boiling point of pure water changes with the altitude.

Altitude Feet	Air Pressure Pounds	Vacuum Possible Inches of Mercury	Boiling Point of Water Deg. F.
Sea level	14.7	29.9	212.0
1,000	14.2	28.8	210.2
2,000	13.7	27.8	208.4
3,000	13.2	26.8	206.6
4,000	12.7	25.8	204.8
5,000	12.2	24.9	202.9
6,000	11.8	24.0	201.1
7,000	11.4	23.1	199.2
8,000	10.9	22.2	197.4
9,000	10.5	21.4	195.4
10,000	10.1	20.6	193.6

At a high altitude, the rate of evaporation or drying at ordinary temperatures is evidently increased. According to work done by the Department of Agriculture, pure water evaporates about 9 per cent faster at 5,000 ft. than at sea level under identical weather conditions.

Evaporation of water at elevated temperatures is also more rapid at high altitudes. A container whose temperature was maintained at 196 deg. F. was found to evaporate water 15 per cent faster at 5,000 ft. and 29 per cent faster at 8,000 ft. than at sea level. During the baking of bread in an oven at about 425 deg. F. the rate of evaporation increases over 7 per cent at 5,000 ft. over what it is at sea level.

Power generated by means of a steam engine or turbine is affected by altitude if the prime mover is run non-condensing. However, more power can be obtained from this type of engine at high altitudes than at low altitudes. The gain in power output amounts to about 5 per cent under certain conditions at 5,000 ft.

The generation of steam in a boiler or the generation of power by means of an internal combustion engine requires the burning of fuel of one kind or another. This burning requires oxygen. Equipment is generally designed to admit the right amount of air or oxygen at sea level. If operated at high altitude the same settings will result in insufficient combustion because not enough oxygen can be obtain. Internal combustion engines drop about 15 per cent in efficiency of 5,000 ft. altitude. This can, of course, be overcome by any means of admitting air such as supercharging. Fuel burning under a boiler requires 17 per cent more air at an altitude of 5,000 ft. and correspondingly larger stack dimensions.

Tests of gas stoves by the Bureau of Standards indicate that gas can be burnt completely at about the same number of cubic feet per hour regardless of altitude. However, the heat value of a certain gas fuel depends on the weight per cubic foot which decreases with an increase in altitude. This results in the maximum output of any gas burner, when measured in B.t.u. being reduced by about 4 per cent for each 1,000 ft. of altitude. At high altitude gas burning equipment must be designed with larger surface openings. provision for more air to be mixed prior to ignition and a larger flue area to operate at the same heat output as those at sea level.

High altitudes introduce problems in domestic and commercial baking which are particularly troublesome in the production of various types of cakes. The companies manufacturing "ready mixed" cake ingredients are finding that a formula does not work with the same satisfaction at high altitudes as at low altitudes. In fact, only the formulas that give poor results at sea level produce better cakes at high altitudes than at sea level. The best formulas for low altitudes produce fallen soggy cakes at high altitudes. These difficulties became so marked that the Colorado State College Experiment Station at Fort Collins undertook several years ago to find out just what were the causes and what means could be taken to overcome them. This work has produced profitable results.

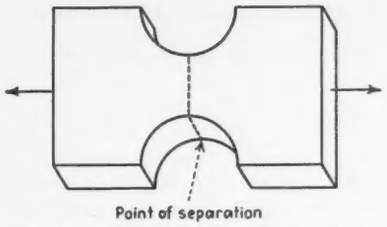


Fig. 2. Shape of cake sample used in testing tenderness.

A special piece of apparatus called the "Altitude Laboratory," (Fig. 1.), was designed and constructed. It consists of a steel tank in which an air pressure corresponding to that of any habitable altitude, can be produced and maintained. In addition, the temperature, humidity, and ventilation are controlled. These features make it possible for an individual to work inside the tank and to carry on various types of experiments under conditions similar to those encountered at any altitude.

Angel food cake was chosen as the first type of cake for experimentation because it is simple in composition. It consists of egg, white flour, sugar and a small amount of acid, generally cream of tartar. After some experimentation, it was noticed that those cakes baked at high altitude were much more tender to the feel and taste than those baked at sea level.

Tenderness of baked products has previously been determined by a method long in use for measuring properties of steel, cement and rubber. The method consists of measuring the force required to pull a sample of cake until it breaks. The specimen is trimmed to the shape shown

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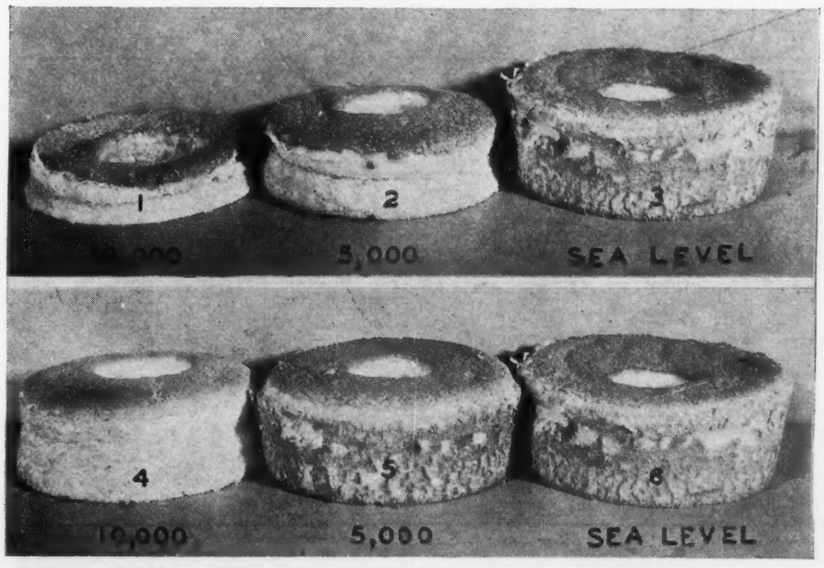


Fig. 3. Cakes (1, 2 and 3) baked from a successful sea level formula and (4, 5 and 6) from formulas corrected for the altitudes at which they were baked.

Small Packer SAVES

Increased production efficiency made this possible. Then further economy was gained by cutting distribution costs.

By D. J. SADLER

Operations Analysis Dept., Quality Bakers of America, New York, N. Y.

▶ ***There is an opportunity for many food plants that are not laid out for straight-line production to cut costs and increase profits. How this can be done is discussed in this article, where a meat-packing plant is the example. In addition to showing what can be done by revamping the layout of departments, the author tells about other means of increasing efficiency, and he shows how distribution costs can be cut and service improved. The principles involved are applicable to***

All Food Manufacturers

PROFIT MARGINS are small in the meat packing industry, as they are in other food processing businesses. So any economies that can be effected in plant and distribution operations have an extremely important bearing on the profit and loss statement at the end of the fiscal year. It was on this premise that a small packing company employing 500 people in processing, packing and shipping decided to have its operations analyzed and eliminate inefficiency. Acting on the information revealed in the analysis, changes were made in plant layout and in plant and distribution practices, and foremen were provided with additional incentive to step up efficiency in their respective departments, of which there were seventeen in the plant. As the net result of this readjustment, sufficient waste motion was eliminated to net a saving in labor costs of no less than $41,298.98 a year, this economy being effected without any investment in new equipment. Then, in addition, distribution costs were reduced and service to customers improved by making more efficient use of trucks and by scheduling drivers on a definite routine.

An example of how efficiencies were improved in the various departments of the plant is illustrated in Fig. 1 and Fig. 2, these showing the "before" and "after" layouts, respectively, of the sausage department. Prior to the revision of this department, meat coming in was hauled in barrels all the way through the department, causing considerable confusion and back tracking. Items processed at the stuffing tables were carried by operators to trees at the end of each table. Continual switching back and forth of these trees to and from the cooking and smoking room caused lost time and congestion.

The new layout permitted straight-line production, eliminated the lost time caused by excessive walking on the part of the employees, and did away with back tracking.

Just what it cost to make this change and how great were the savings resulting from it are shown in Table I. It will be seen that added labor costs for changing the layout amounted to $149.32, while $68 was spent for materials, making a total cost of $217.32. But labor costs in the sausage operations dropped from $1.230 per hundredweight with the old layout to $1.084 after the revision was made, which is a net reduction of 11.8 per cent. And within a period of twelve months increased production, coupled with more efficient method of operation, showed a labor-cost average of $0.95 per hundred-weight. In line with this, the volume of small unit items, was greatly increased.

The value of the studies made of operations in the hog killing, cutting and trimming departments is indicated by the costs and savings figures of Table II. The studies not only determined the most economical operating speeds in these departments, but showed that by killing on alternate days and utilizing the same operators for cutting and trimming the day following killing, the killing and processing could be done in a more economical manner.

As indicated in the table, there was a saving of 25 per cent in killing cost when the operation was carried out at a speed of 200 instead of 150 hogs an hour, the cost in the one case being $0.169 per hog and in the other $0.127. In the total cost of killing, cutting and trimming, a saving of $161.97 per week was made when the killing was done at 200 an hour instead of 150 an hour, this saving being on a volume of 4,153 hogs.

With the killing rate stepped up to 225 hogs per hour by adding two women and one man to the gang,

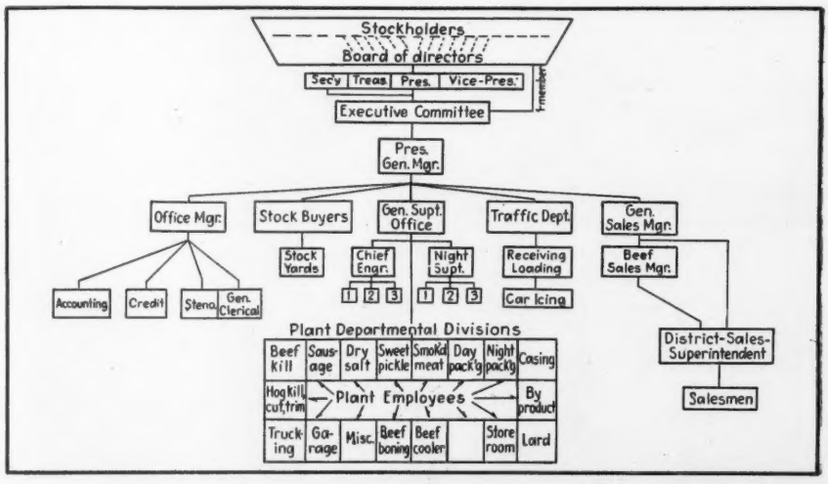


Fig. 3—Operating schedule established to provide the supervisory control necessary to the success of the efficiency program. It sets up definite lines of authority and prevents overlapping of supervisory duties.

$41,298 *In Year*

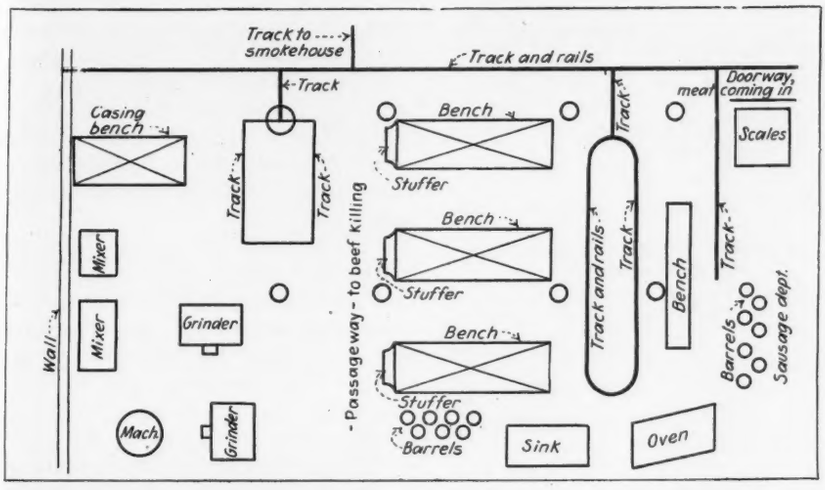


Fig. 1—Original layout of sausage department, arrangement of processing and conveying equipment being such as to cause much waste motion on the part of the employees.

even greater economy resulted. The added labor cost in this case amounted to $60, but even so the saving totaled $193.06 in a week's time.

In addition to altering department layouts and establishing more efficient operating schedules, an efficiency contest was started which developed a competitive spirit among the foremen of all departments. The success of this contest is illustrated by the fact that the box-department foreman decreased his cost per 100 boxes from $1.358 to $1.054. The results from the contest were so gratifying that the management decided to carry on a similar one during the following year. And to make it more interesting, prizes were more than doubled in value.

TABLE I—Comparison of the Cost of Revising Sausage Department with Savings Attributed to Change.

Cost of Revision

Previous average totals, electrical department	$35.64
Previous average totals, mechanical department	300.00
Week ended March 23d, labor, mechanical department	380.88
Week ended March 23d, labor, electrical department	44.75
Week ended March 30th, labor, mechanical department	325.59
Week ended March 30th, labor, electrical department	69.38
Total two weeks	$820.60
Previous Average—$300 plus $35.64 (two weeks)	671.28
Difference—added labor cost	$149.32
Plus materials	68.00
Total cost	$217.32

Labor Costs in Sausage Manufacturing

Previous to revision—average	$1.230 per cwt.
After revision	1.084 per cwt
Savings or 11.8%	0.146 per cwt.

The rules for the efficiency contest, as sent to each foreman, were as follows:

1. Your department's average "unit labor cost" for the four-week period ending Nov. 30, 1935, will be your standard.

2. The contest starts Dec. 1, 1935, and ends Sept. 26, 1936.

3. For each period, your department's labor cost will be averaged, and these figures will be used in the contest on a percentage of the "increased" or "decreased" efficiency rating.

4. The table for rating and standing follows:

(*a*) Ten points will be credited to you for each 1 per cent decrease in unit labor cost.

(*b*) Ten points will be deducted for each 1 per cent increase in unit labor cost.

As a net result of all the economy activities, savings of $659.97 per week were made in plant operations plus $134.24 per week in the sausage department. In a year's time this adds up to a total of $41,298.98, the detailed figures on final costs and savings being listed in Table III.

A factor which has considerable bearing on the success of a program for increasing the efficiency of operations is proper supervision. Definite lines of authority must be established in order to clearly define lines of operation and to prevent overlapping of supervisory duties. The operating schedule which worked out quite satisfactorily in this meat plant is illustrated in Fig. 3.

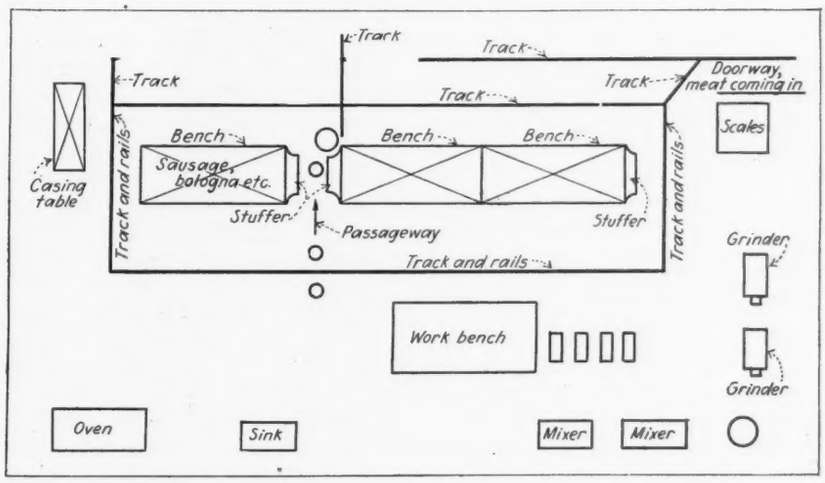


Fig. 2—Sausage department as revamped to eliminate unnecessary steps on part of workers and to avoid back tracking of products and supplies.

Aside from the increased efficiency introduced into the production operations, much was done at this meat plant in the way of curtailing delivery costs, an item often considered a minor operating expense but usually being quite the opposite. An analysis of vehicle operations by a firm of nationaliy known transportation consulting engineers was made.

TABLE II—Cost and Savings at Different Rates of Handling in Killing, Cutting and Trimming Departments.

Killing done at rate of 150 hogs an hour

Total killing cost (inc. kill and offal), based on 8-week average..... $699.12
Average number of hogs killed, based on 8-week average..... 4,148
Killing cost per hog, based on the above average 0.169
Cost per hour $25.35 at 150 per hr.

Killing rate of 200 hogs an hour (same crew)

Cost per hour..$25.35—$0.127 per hog
Hogs per hour.. 200

Summary

$0.169 — at 150 per hour
0.127 — at 200 per hour

0.042 — saving (approx.)
0.042 = 25% saving on killing cost
0.042 saving per hog
50 hogs per hour increased speed
$21.00 saving per hour on killing cost

Cutting Costs

Total cutting cost (inc. trim., spec. boning and fresh pork pack), based on 8-week average $862.18
Average number of hogs cut, based on 8-week average..... 4,153
Cutting cost per hog, based on the above average $0.208
Cost per hour—$52.00 at 250 hogs per hour

Summary

$0.127 cost per hog kill at 200 hogs per hour
0.208 cost per hog cut at 250 hogs per hour

0.335 total cost

Total on killing, cutting and trimming

Cost—previous 8-week average.....$1,561.56
Hogs—previous 8-week average..... 4,153

Average cost per hog..... $0.374
$0.374 at 150 speed on kill
0.335 at 200 speed on kill

0.039 savings per hog
4,153 average number of hogs
.039 savings per hog

$161.967
$161.97 per week saving at 200 hogs per hour

Killing rate of 225 hogs per hour, with additional operators

2 women at $19.00 cost. $38.00
1 man at $22.00 cost.... 22.00

$60.00 additional cost

Killing cost = $699.12
plus 60.00 (3 operators)

$759.12 Total for 4,148 total hogs
$0.183 = cost per hog
27.45 = cost per hour (at 150 per hour)
$0.122 = cost per hog killed at 225 per hour
4,148 = average kill
$0.122 = cost each at 225 speed

$506.056 = total cost
$699.12—506.06 = $193.06 saving at 225 per hour, including the additional cost of three operators.

and as a result a program of preventive maintenance was put into effect. Then the cost comparison compiled for each vehicle was used as a basis of establishing a daily program of dispatching and scheduling route trips.

Through the use of a Servis Recorder and the employment of an observer to ride the routes several times with each driver, it was possible to schedule the drivers on a definite routine in reference to leaving the plant in time to make the first stop on a schedule basis. This eliminated variations in delivery time to customers and permitted salesmen to promise a scheduled delivery.

A summarization was made of daily trucking costs to serve as a basis for controlling operations on a mileage and tonnage standard, as illustrated in Fig. 4, Fig. 5 and Fig. 6. From these factors an established tonnage capacity for each truck was determined for the purpose of dispatching a vehicle from the standpoint of its operating cost.

In this manner it was proven, for example, that it was much more economical to dispatch a truck with a 7,500-lb. load capacity on a trip of 250 miles rather than a truck having a 10,000-lb. capacity. The heavier trucks were kept closer to the plant, except in cases where the load was too big for the others or where it was not practical to operate a large truck, as in a metropolitan area with narrow alleys and streets. An analysis of city-route deliveries showed that the tonnage of load delivered, as well as the express service required, necessitated the purchase of several trucks having less load capacity to effect savings in city-delivery costs.

The importance of proper and adequate records on fleet operations was demonstrated by the fact that better and more efficient deliveries were made at a decreased fleet-operating cost.

The law of supply and demand controls to great extent the cost of raw material and the price of the finished product in the meat packing industry. And, because of fluctuations in costs and prices and the keen competition in the industry, it is imperative that operations in the plant be performed in the most economical manner. The labor situation alone indicates that if higher wages are to be paid, these must be compensated for not so much from higher prices of products but from savings in plant operations. Since the difference in profit or loss may lie in a small fraction of a cent a pound of product bought or sold, every detail of operation requires careful study. Furthermore a definite means of controlling costs must be established in each department.

At the plant in which were made the savings discussed above, a departmental cost system had been in operation for a number of years. This system accurately distributed actual manufacturing costs, as well as proportionate overhead charges, to each department, thereby determining the profit or loss of each department periodically. The completeness of this system proved an invaluable guide and served as a basis for the operation analysis.

Date 1-20-37 — Master Copy — Daily Trucking Cost

Driver	Route	Trk. No.	Mileage	Poundage	Lbr. Cost time	Gas	Oil	Fxg. cg.	Cost per mile	Cst. cwt.
		55	180	8200	(3) 8.63	19 2 85	1-11	5.67	.096	.210

FIG. 4

Truck Route — Trucking Cost (Recap. by Route) — Master Copy

Date	Driver	Truck No.	Mileage	Pounds	Driver Labor Cost	Gas Gal. Cst.	Oil Qt Cost	Fixed charges	Total	Oper. Cost mile	Gar. Cost mile	Oper. Cost cwt.	Gar. Cost cwt.	Total Cost Mile	Total Cost cwt.
1-23-37		55	1 80	8200	(3) 8.63	19 2 85	1 1	11 5 67	17 26	.096	.015	.210	.036	11 1	24 6

FIG. 5

Week ending 1-23-37 — Trucking Cost Recap - For Cost Distribution — Master Copy

55/9/28/36

Routes	Tonnage	Cost	Cost Mile	Cost cwt.
Av. mile 180	(3) 24600	51.50	.107	.209

FIG. 6

Fig. 4—Form used in keeping record of daily trucking costs on all routes. Fig. 5—Form employed for enumerating trucking costs by route. Fig. 6—Cost sheet for summarizing trucking expenses for week.

TABLE III—Final Analysis of Costs on a Comparative Basis.

	Week ending 2/2/35	Week ending 12/15/35
Approx. kill	= 5,124	5,156
Aver. labor cost per unit	= $1.638	$1.510
Sausage production	= 68,179 lb.	92,013 lb.
/ payroll	=$838.48	$997.81
/ unit cost	=$ 1.230 per cwt.	$ 1.084 per cwt.

Summary

$1.638 labor cost (approx. kill unit basis) 2/2/35
1.510 / / / / / / 12/15/35

$0.128 savings per head

5,156 at 0.128 = $659.97 savings per week
$659.97 at 52 weeks per year = $34,318.44 savings per year

plus

Sausage savings of 0.146 per cwt. on 92,013 lb. per week = $134.24 per week at 52 weeks = $6,980.48
Total savings = $34,318.44 plus sausage savings of $6,980.48 = $41,298.98 saved in labor costs alone

Tests in Breweries Show

Germicidal Paints Retain Protective Powers

By S. S. EPSTEIN
Germ Proof Paint Co., Brooklyn, N.Y.

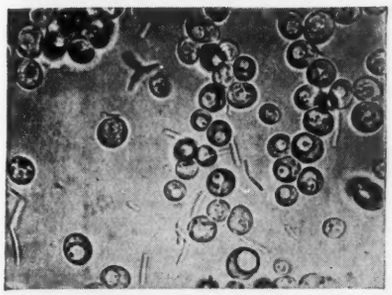


Fig. 1. Infection of beer yeast with lactic acid rod-like bacteria causes turbidity and a characteristic sour (tart) taste.

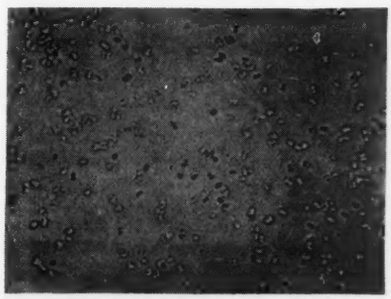


Fig. 2. "Sarcina disease" in beer results in an objectionable odor and flavor as well as causes turbidity and a sediment.

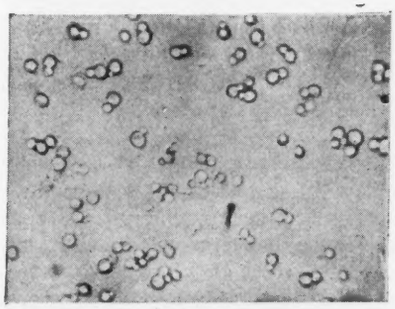


Fig. 3. Torulae, non-spore forming yeast-like micro-organisms, are likely to produce objectionable secondary fermentation in beer. It is only one of several species of "wild yeasts" that the brewer has to contend with in pure culture fermentation.

Fig. 4. Acetic acid short rod-like bacteria not only give beer a sour vinegar-like taste and odor, but also form a film over the surface of beer or wort.

FIFTY YEARS AGO many breweries closed down during the months of June to September [1] because of the "bad" beer resulting from micro-organism infections.

Today breweries operate throughout the year because of the adoption of improved processing equipment and of more effective control of polluted air by air conditioning.

However, serious contaminations are not infrequent even today. Some of these contaminations may be airborne in spite of air conditioning systems. The predominating type of in-

(Turn to page 541)

▶ ***Industrial use of halogenated-oil base paints in breweries, oil-containing food plant and hospital proves that germicidal paints can be relied upon to avoid micro-organism contaminations and to prevent the spread of micro-organism infections in***

Bakeries
Beverage Plants
Breweries
Canning Plants
Meat Packing Plants
Milk Products Plants
Other Food Plants

Results of Investigation of Surface Contamination in Various Parts of Different Breweries

Location	Number of Microorganisms Recovered From Smears of Sixty-Four Square Inch Areas						Microorganisms Developing in Brewery Wort »			Microorganisms Developing in Beer »		
	Brewery A		Brewery B		Brewery C							
	No. of Tests	Average Count	No. of Tests	Average Count	No. of Tests	Average Count	Brewery A	Brewery B	Brewery C	Brewery A	Brewery B	Brewery C
Brew House..	...	.....	...	.....	1	9,950	.....	.....	Wild Yeasts Torulae Rods	.....	.....	Wild Yeasts Torulae Rods
Baudelot Wort Cooler Room	2	2,175*	2	110**	...	.....	Non-brewers' Yeasts Torulae Rods Sarcinae	Wild Yeasts Torulae Rods	.....	Non-brewers' Yeasts Torulae Rods	Torulae Rods	.....
Fermentation Cellar	3	16,650	2	5,750	1	1,250	Wild Yeasts Torulae Rods	Molds Wild Yeasts Torulae Rods	Wild Yeasts Torulae Rods	Wild Yeasts Torulae Rods Sarcinae	Wild Yeasts Rods Sarcinae	Wild Yeasts Rods
Storage Cellar	3	19,600	3	53,350	1	2,500	Molds Wild Yeasts Torulae Rods Sarcinae	Wild Yeasts Torulae Rods Sarcinae	Wild Yeasts Torulae Rods Sarcinae	Molds Wild Yeasts Torulae Rods	Wild Yeasts Torulae Rods Sarcinae	Wild Yeasts Rods
Racking Cellar	1	32,000	1	650	...	17,950	Wild Yeasts Torulae Rods	Non-brewers' Yeasts Torulae Rods	Wild Yeasts Torulae Rods	Wild Yeasts Torulae Rods Sarcinae	Torulae Rods	Wild Yeasts Torulae Rods Sarcinae
Wash House..	...	.....	...	.....	2 2	1,825* 28,450 **	.....	.....	Wild Yeasts Torulae Rods	.....	.....	Wild Yeasts Rods

* Cooler Room equipped with air conditioning and filtration system and walls coated with general-use paint.
** Cooler Room painted with halogenated-oil paint 5 months prior to test.
* Wash House painted with halogenated-oil paint 2 weeks prior to test.
** Wash House painted with ordinary commercial paint 2 weeks prior to test.
» Wild yeasts are based on positive sporulation tests on gypsum blocks.

"POINT OF SALE, INC." To Legalize Outlawed Advertising Allowances

PASSAGE of the Robinson-Patman Law offered to food men an excuse to fan into active warfare the smoldering conflict between nationally advertised and private label brands. Encouraged by victory in early skirmishes, distributors are confident, no longer bluffing. The movement has grown until it is rapidly approaching the proportions of a boycott, even though the various organizations are acting independently. Reports and field investigations indicate that group organizations are discontinuing many nationally advertised brands that conflict with their leading private labels. Under this pressure some few national advertisers have further committed themselves to manufacturing for private label distributors.

It is fortunate for the nationally advertised brand manufacturer that the super-market movement has gained the momentum it has. Supermarkets, even though operated by the corporate chains, derive a large portion of their popularity and success from the number and variety of food products displayed. To an extent at least, sales to supermarkets have mitigated the penalties placed on nationally advertised brands by private label distributors.

Manufacturers of national brands cannot afford to lose the portion of the market controlled by the corporate and voluntary chains, because the corporate-voluntary market is too large a portion of the total. The estrangement of the nationally advertised brand manufacturer from the chain is costly, apparently most costly to the manufacturer.

Although there have always been minor conflicts and differences between manufacturers and distributors, active warfare was not declared until after the passage of the Robinson-Patman act, which divorced the chain distributors from the advertising discounts and other allowances that had represented much, if not all, of the profit that the chain had made from the sale of nationally advertised products. To A. & P., as disclosed by the House investigation, these discounts and allowances had amounted to approximately $8,105,000 per year during 1934, equivalent to 48.5 per cent of annual profits.

The chains want the discounts or their equivalent. These represent too large a portion of annual profit to relinquish without a struggle. Manufacturers of national brands want local advertising, and window and counter displays of their merchandise. They also want the sales "push" of retail clerks. Manufacturers *were* willing to pay for these services. Unquestionably many manufacturers would again willingly *pay the price* to derive the same benefits.

RECOGNIZING the growing estrangement of the two, as well as the actual value of each to the other, "Point of Sale, Incorporated" is attempting to close the breach between national brands and chain distributors and establish an armistice, if not peace. Point of Sale, Inc., is attempting to accomplish with some 200,000 retail outlets what Barron G. Collier & Co. did with a scattered group of street railway companies, subways and steam railways. Barron G. Collier & Co., contracted for space in the coaches of the various transportation compainies, formed a new advertising medium, and sold the space to national and local advertisers. Point of Sale, Inc., is contracting with chains, voluntaries and independents for point-of-purchase display space in their stores, thus forming a new controlled and auditable medium. This medium the newly formed company expects to sell on a standardized rate basis to manufacturers of food and grocery items. The display services at the point of purchase, which will be offered singly or as a group to food manufacturers, consist of window displays, counter and floor displays, inside or outside streamers and mention in local store newspaper or handbill advertising. These services are sold to the national advertiser according to a definite rate structure which varies with the annual sales volume of the outlet. Store traffic is considered proportional to annual sales volume. Point-of-purchase display rates are therefore to be commensurate with store traffic as reflected by annual sales volume.

The rates paid to retail outlets by Point of Sale, Inc., for point-of-purchase display space is apparently little more than half the amount the larger chains were receiving from manufacturers in the form of advertising discounts and allowances. Undoubtedly, many of the chains will consider the inducements sufficient and further consider that they have much more to gain than to lose. With many of the chains, the display revenue from manufacturers for continued use of their outlets would go a long way toward paying the chain store tax. Regardless of the revenue they receive from manufacturers for display service, the chain stores can and will still push their private brands. Some of the chains may offer through Point of Sale, Inc., reserve list services only. Point-of-purchase display space in the stores will be sold only to those manufacturers whose products do not conflict with the chain's private label leaders.

While a few manufacturers will not be able to buy any display service in at least a portion of the chain outlets, they will nevertheless be able to buy elsewhere point-of-purchase display services not purchaseable at the present. By the advice of the company's counsel it will be legal, legitimate and will be no evasion of the Robinson-Patman law. And, furthermore, the manufacturer is guaranteed and assured that he gets actually what he pays for. Few manufacturers ever receive point-of-purchase display and support commensurate either with the investment or with retailer's promises. The assurance that the manufacturer gets full measure for his

investment comes through the services of Ross Federal Research, Inc. Payments made by manufacturers and received by retail outlets for display services will be proportional to the display services actually in use as determined by a 5 per cent checked sample. This is the audit structure which is to guarantee fair return for the manufacturer's investment.

There are several noteworthy clauses in the contract terms, both those designed for the manufacturer and those for the distributor. Manufacturers are guaranteed that during the week their displays are up, no competitive brand will be displayed. Stores are grouped according to sales volume—A, B, C, D, E., those with sales above $100,000 per year, $40,000 per year, $26,000 per year, etc. A manufacturer can buy any group on a national scale, or spot his locations. If a retailer's window or other display facilities are not "engaged," he may lease to any manufacturer, however, at no other price than the contract price with Point of Sale, Inc.

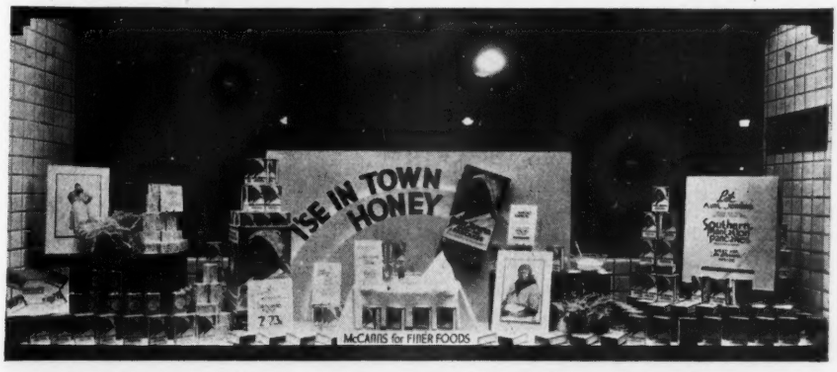
Although as a part of its service, Point of Sale, Inc., supplies each retail outlet with complete detailed instructions for the displays to be set up in each store each week, and supervises the delivery of point-of-purchase material to the retail outlet, Point of Sale, Inc., does not set up displays, arrange windows or perform any similar services. These services may, however, be purchased from an associate organization, Display Creators, Inc., whose services may be obtained to create or prepare displays and follow through to actual erection in the retail outlet.

Although few contracts with retailers have been signed, enough tentative agreements have been reached so that Point of Sale, Inc., can guarantee 75,000 display outlets by the middle of September. Point of Sale, Inc., has agency recognition. Agency accounts are commissionable.

So many distributors make a neat profit from waste paper junkmen through the sale of manufacturer's point-of-purchase materials, that there is no question that manufacturers have wasted millions of dollars attempting to get representation in retail stores. Possibly some manufacturers will now be able to get value received for the money they expend on point-of-purchase display material, in so far as they will actually get it into use in retail outlets.

There is too much display competition in the super-market to warrant expenditure there for special display. All items are specially displayed. Few super-markets have display windows. The services the super-market can offer are limited to outside streamers, and newspaper or handbill advertisements. Few supers will be signed up. Then there is that vast horde of retail outlets whose sales volume is less than $5,000 per year. Point-of-sale display in this type of store is of little value, and the return to the store owner too meagre to be much inducement.

While one evil of point-of-purchase display may be corrected, another remains an evil still. The display facilities of all retail outlets can supply the requirements of but a limited number of food manufacturers. Even if Point of Sale, Inc., succeeds in contracting for *all* the desirable display accommodation and can offer a controlled, audited point-of-sale medium, even then many manufacturers will still be unable to obtain adequate representation at the point of purchase.



The display in this window, with the aid of additional promotion of McCann Co., Pittsburgh, increased pancake sales to more than ten times former volume. Is it any wonder manufacturers are disgruntled because distributors' brands now get the place of purchase display once accorded national brands?

Chains know the value of their windows and other point-of-sale promotion. This type of advertising once extensively used to promote national brands is now building sales volume for their own private labels.

Why Grocery Co-ops Have Little Chance *in the United States*

THE DIGEST of the Report of the President's Committee of Inquiry on the Cooperative Enterprise in Europe indicates that the committee is not optimistic over the immediate prospects of consumer cooperative movements in this country, especially in the food field. The committee accords approval to the co-op movement in Europe, but finds that the conditions that justify the European institutions do not exist in the same degree in this country. The opinions of the members of the committee generally agree—not any of the members appear to view the American movement as anything more than just another form of retail competition.

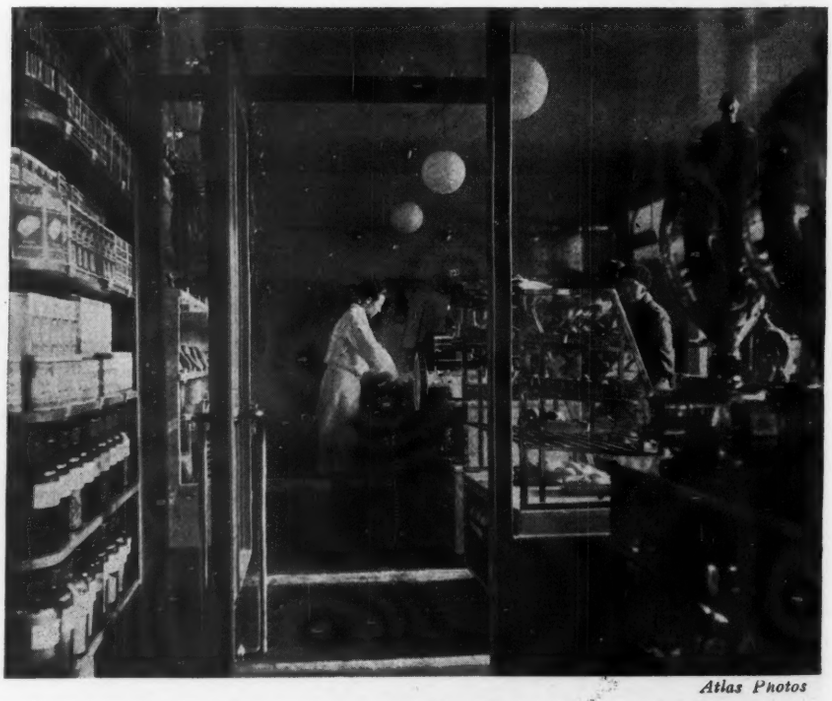
The benefits attributed to the European consumer cooperatives are as follows:

- Members share in the profits of the enterprise.
- Prices are reduced.
- The family economy of co-op members is improved.
- Living standards in general have advanced.
- The efficiency of merchandising has been increased.
- Government interference with business is made less necessary.
- Private traders unable to withstand any kind of intelligent and aggressive competition have suffered; but the co-op has not injured general business.

The commission points out that European conditions favored the development of consumer cooperatives, but that these conditions do not exist in the same degree, if at all, in this country. Absence of anti-trust laws in Europe encouraged practices ultimately favorable to the growth of the co-ops. The Pure Food and Drug Laws of this country protect the consumer to such an extent that this function of the European cooperative is of little worth in the United States. European cooperatives introduced noteworthy improvements in merchandising over existing European standards. However, the most advanced European cooperative would experience difficulty in surviving the competition of the highly developed merchandising system that exists in this country. The commission recognizes that, although the consumer co-op in Europe has been progressive, it has not been creative. Though it has improved merchandising and raised merchandising standards, it has not developed anything vitally new.

The European co-op moves slowly. A period of ten years is required to develop a co-op into a sound institution. In Europe the tempo is much slower than the American tempo. Present-day America is restless. Several decades ago the retailer's customer was his customer for life. Today, however, sons and daughters of those same customers buy in one place, tomorrow in another. Steadfast loyalty is an essential ingredient to the success of the consumer cooperative. The American is ardent in his loyalty—today to one institution, organization or establishment—tomorrow to another. The American is anybody's customer who can sell him. The few places where consumer co-ops can and will build solidly into the community are those places where distribution methods or facilities are at low ebb. The outstanding exception is where unassimilated bits of Europe have been transplanted into this country, bringing with them traditions, methods and customs characteristic of the mother country. Many of these unassimilated European "colonies" exist in Wisconsin, Minnesota, and the Dakotas. A strong consumer cooperative exists among the Finns in Massachusetts.

Records of European co-ops disclose failures as well as successes.



Atlas Photos

Interior view in Stockholm consumer cooperative shows products of American manufacturers on shelves. This fact should minimize fear of the co-op movement in this country.

Atlas Photos

Europe's largest co-op in Stockholm, Sweden. Note the new type outside elevator and overhead arcade.

Rarely, however, do the failures get the same publicity as do the successes. An essential of the co-op's success is a devoted, competent leader who is more interested in the success of the movement than in his own financial advancement. Without good management, cooperative success is impossible—yet co-ops pay their managers very low salaries. In this country where the almighty dollar is such a potent factor in obtaining and retaining competent individual initiative, the low salary inducements of the co-ops handicap them from the start. High salaries and large payrolls limit the importance of one of the co-op's major inducements, annual dividends to members.

According to the report of Clifford V. Gregory, "Cooperative theory deplores the waste that results from catering to style; from giving the consumer a wide variety of choice." Geared as the American people are to style changes and keeping up with the Joneses, they compel the successful cooperative in this country to abandon at least this basic principle.

In the separate report of each member of the commission emphasis was placed upon the disastrous results that would follow should the government subsidize the cooperative movement. They all suggest that cooperatives be given only the opportunities accorded private industry.

The commission seems to feel that if the cooperative movement could get a stronger foothold in this country, it would act as a curb to existing nefarious business practices. Although the commission believes that more co-ops in this country would be a benefit to business, they do not seem to expect the movement to expand with any degree of rapidity. American chain stores, voluntary chains and mail order houses have accomplished in the United States what the co-ops have in Europe. They have forced retailing margins down, stimulated a high degree of competition and improved merchandising practices beyond anything the world elsewhere knows.

The supermarket threatens still further to limit the opportunities of the co-op. The supermarket opens its doors with an enormous inventory. It is geared from the start to supply the demands of thousands of families. The co-op must start small. Limited at first in membership, limited also must be its inventory. It cannot return attractive dividends to its members and compete in price with the supermarket, which can operate on a mark-up much below that of the chain.

The co-op movement in this country started in a feeble way years ago, long before supermarkets had made their contributions to modern food merchandising. The co-ops in 1935 accounted for less than 0.5 per cent of total food sales.* Gains since then have not been appreciable. Estimates allot to the supermarket as high as 15-20 per cent of food sales. Although these estimates are high, nevertheless the supermarket movement is a far more important factor in food distribution than the co-op.

The cooperative movement can and will root deeply into this country only when it serves an economic need which does not exist in any real measure at the present time. If retailers, wholesalers and manufacturers in the food field in this country not only maintain their present standards of efficiency but continue to improve them in the future as they have in the past, the cooperative movement will present no threat of importance to present methods of distribution.

** The Census of Retail Distribution reports the retail food sales of rolling stores, itinerant venders, market stands, road-side stands and consumer co-ops as less than five-tenths of 1 per cent of grocery store sales.*

New

Meet the Quart Beer Can

ACCORDING to statistics, the sale of beer in packaged form has increased from 31 per cent of total sales to 42 per cent, between the years 1933 and 1937. Package sales represent home consumption. Brewers generally are interested in having a larger percentage total beer sales sold to the consumer in packaged form, for carry out and home consumption. Due to the pressure inside the container, beer in quart sizes has only been packaged in glass containers. However, recently a quart metal container has been designed, which meets all pressure requirements. Horton Brewing Co., New York, is now offering beer packaged in metal quarts as well as in glass quarts.

Package Appeals to Tourists

S. S. PIERCE Co., Boston, is capitalizing on the tourist habit of sending home postcards and souvenirs as well as the association in the mind of most people of baked beans and brown bread with Boston, Mass. S. S. Pierce Co. packs a can each of "Baked Beans and Brown Bread from Boston," in a shipping container which provides space for address and stamps. Many packages of Pierce's "Baked Beans and Brown Bread from Boston" have been shipped this season by tourists to all parts of the country.

Re-use Package for Pepper

THE FRANK TEA & SPICE Co., Cincinnati, has introduced a novel re-use package for its ground pepper. Opaque glass containers, suitable for permanent shelf use in the kitchen carry the fused labels "salt" and "pepper." The figures that remain on the re-use containers are in blue with blue lettering. The paper label is black on silver.

Coffee Concentrate Dispenser

"RED-E-COFFEE", a coffee concentrate is now offered to the trade by Coffee Products Co., New York. The concentrate is packaged in pint bottles which are to be fitted in to special dispensers at soda fountains and lunch counters where "Red-E-Coffee" is served. A valve mechanism in the neck of the dispenser delivers a measured teaspoon of concentrate each time the dispenser is tipped.

Shreaded Wheat Cracker

THE METHOD USED to introduce National Biscuit Company's new product, "Salted

Lowly Potato Glorified

SUCCESS has been obtained by a number of companies who have introduced into the food market products free from existing specific competition. Canned potatoes creamed with cheese is one of these products recently introduced. "B. & M." Delmonico Potatoes, product of Burnham & Morrill Co., Portland, Me., are diced Maine select potatoes processed with cream sauce and cheese, ready to be served either heated in the can or in casserole.

PACKAGES AND PRODUCTS

Triscuits" is as novel as the product itself. Triscuits look like well browned crackers made of "Shredded Wheat." They are crisp, salty to the taste and require more chewing than other crackers. Recently they have reached the Eastern market in sample form to the consumer, as well as on the dealer's shelves. Sample packages of salted Triscuits separately wrapped in transparent paper are inclosed in Shredded Wheat containers.

New Product Fits Many Menus

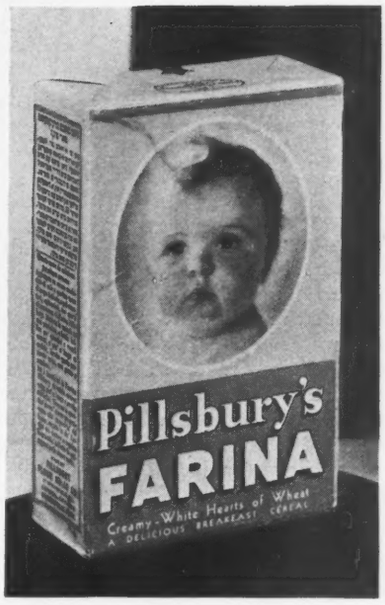
GORTON-PEW FISHERIES Co., Gloucester, is announcing to food distributors a new fish product. "Fishroyal" is the product of more than a year of research and many consumer tests. The product, a blend of fish, butter, cream and seasoning, may be eaten as it comes from the can without further preparation, seasoning or flavoring. It may also be served hot or cold, is suitable for a sandwich spread, for salads, may be served as hors d'oeuvres, or made into croquettes. It is suitable for almost any kind of fish dish, such as au gratin, hash or pie. The 10-oz. flat can carries a label which, although strikingly similar to the package design of the Gorton family, varies slightly from the other members.

Another Handy Handle

PACKAGES with a handy handle are popular with super-market operators. These packages have a consumer appeal that attracts the super-market merchandisers (FOOD INDUSTRIES, August, 1937, p. 499), B. M. Reeves Co., New York, has capitalized on this merchandising idea for its "Everoyal Stuffed Olives." Super-market operators report that the handy handle has a decided merchandising importance.

Capitalizes on Baby Appeal

PILLSBURY FLOUR MILLS Co., Minneapolis, identified Pillsbury's "Farina" as a baby food through the use of an appealing baby picture on the package. The package is now transparent cellulose wrapped.



Product Adapted to Container

PEANUT BUTTER, sufficiently fluid so that it can be extruded from a collapsible metal tube, is the product of Sun-Rose Nut Spread Co., Maywood, Ill. Although the product contains sufficient oil to permit it to be extruded freely, the oil separation obstacle common to most peanut butters has been overcome. "Lurch's" nut spread, packaged in one and three-fourths ounce tubes, is displayed in combination with a package of Ritz crackers. Both products, inclosed in a transparent cellulose bag, make a new and novel display.

Merchandising HINTS AND HURDLES

Kroger Won't Retreat. When A. & P. rough-rode the National Brands in the Lousiana yellow handbill episode, it gained much attention but the sensation was soon forgotten. It was but a local affair—A. & P. retreated with promises. Macy's spectacular attacks have been aggressive and prolonged. That battle promises no quarter. Macy's war is, however, local to the New York area. The recent Kroger advertising campaign throughout the area covered by the chain is neither local, nor will there be a retreat. No names are mentioned in the Kroger price comparisons. They take on all comers. The battle of the brands was never at peace, is no longer at armistice. It is now a fight to the finish. At least 30 per cent of the packaged groceries sold by Kroger are private labels. When Kroger meats, dairy products and other items are included, Kroger private labels will account for between a third and a half of total Kroger sales, a figure somewhere above $100,000,000 a year. Those manufacturers who supply processed foods to the private label trade are jubilant. National brand manufacturers are worried. The war, however, is not over.

Voluntary Chain to be Taxed. The state of Georgia has extended the application of the Georgia chain store tax to include members of voluntary groups, whether wholesaler or retailer owned. In states where popular referendum has prevented the tax on chain stores, chains have extended their field of operation by organizing their own voluntary groups. Whether state greed for taxes or a determination completely to handicap all organized retail groups was behind the Georgia legislation is less important to the manufacturer of foods than the fact that merchandising foods in Georgia will present new problems.

Varieties Copy Food Chains. The food chains gained for themselves the good will of the farmers of the country and the fishing industry by promoting and creating a demand for certain agricultural and seafood products. Although their efforts were not favorably appraised by F.T.C., their efforts were recognized by voters sufficiently to affect legislation. Now the variety and drug chains have adopted the food chain policies and are vigorously promoting the sale of milk and milk products. The increased sales volume of these products through their numerous outlets, will no doubt favorably impress the dairy farmer. It is late, but not too late, for the food manufacturer to acquaint the American populace, particularly the voting populace, with the advancement the food manufacturer has made in the processing of food,—the scientific analyses he uses, the sanitary measures he employs, the extent to which he has reduced the cost of living, the extent to which he has brought many of the luxuries as well as the necessities of life within the economic as well as the material reach of most of our 128,000,000 people. In spite of a few blemishes and rot spots, the food manufacturer has a romantic and convincing story to tell. The ill repute accorded the industry as indicated by recent legislation could certainly be mitigated if the food industries would but acquaint the world with all the facts. It is time to bring the light out from under the bushel.

To emphasize to the consumer the fact that "B & M" brick-oven baked beans, product of Burnham & Morrill Co., Portland, are oven-baked, the company has offered for sale, small individual baked beans pots at 5 cents each. The company offers also a large pot to contain one can of baked beans. Beans heated in the large pot may be served from it at the table. The small pots contain an individual serving and come to the table hot from the oven. More than 100,000 of these pots were sold in the first few months of the offering

Independents vs. Chains. The Empire State Independent Retailers and Wholesalers Association, retaining Samuel Untermeyer as attorney and Governor Lehman's publicity manager Victor Lawn as secretary, has been formed to protect New York State independents from the inroads of the chains. Legislation is to be prepared by the association and introduced at the next session of the State legislature. One of the "ruthless tactics" of the chains condemned by the association is the creation of "so-called Super-Markets" by which the chains are able to consolidate their weaker units into larger and more substantial units. The independents seem to have forgotten that the super-market was the creation of the independent as the means of meeting chain competition. They also seem to forget that independent retailers found considerable solace in the fact that sales of chain store units dropped appreciably in the neighborhoods of the independent-owned supermarkets.

Should It Be Traded?

You can't tell by looking

AGE, mileage, cost of repairs and trade-in allowance are factors bearing on the question of when to trade a used truck or commercial car for a new one. There are others, too, including the suitability of the vehicle to the purpose it serves. In fact, the problem of when to trade and when not to is something that causes headaches for all fleet operators. What some of these operators say should be done is included in the following paragraphs:

Straight-Line Cost Method

We use a residual system of depreciation. Gasoline-powered units are divided into three classes, depending upon their gross cost, as follows: Up to $1,250 original cost, 52 per cent per annum on residual basis; $1,250 to $2,500, 33½ per cent residual basis per annum; over $2,500, 26 per cent residual basis per annum.

In a large, scattered fleet I feel the time basis is preferable to mileage, on account of simplification in accounting. We encounter many conditions where the time basis is not entirely satisfactory. However, on the average, it is preferable to the mileage basis.

In making a decision as to the proper time to replace a vehicle, the following questions should be asked:

Is the unit the proper size to perform satisfactorily the work it is doing?

Does it have the proper size body to do the work most effectively?

Is the unit of proper type?

Will it cover the route satisfactorily if reconditioned?

Is the manufacturer's or dealer's service available for making proper repairs on the unit?

What is the reconditioning cost?

No single answer to the above is a determining factor, but a summation of all angles to the problem should be carefully considered. The economic life of a motor vehicle is of a variable nature. It depends first upon the quality of the vehicle initially, and then how the unit has been handled while in service. Overloading and overspeeding are the two great deteriorating factors. Negligence and poor handling are equally important.

We endeavor to maintain a straight-line operating cost. With our system of depreciation, if you add the repair expense to the depreciation, this total figure each year should remain constant, or be lower than the previous year for the continued operation of the truck to prove economical. As the summations of these two accounts are plotted over the life of the truck, that curve should be either a straight line or one that is bending downward. If the trend of the curve is upward from a straight line, your operating costs are increasing and the truck should be replaced.

Consider a specific light-duty truck whose original cost three years ago was $850, which is of the proper size and type and on which manufacturer's service is available. The present book value with our system of depreciation is $97. It is reasonable to expect that this unit could be turned in on one in the same price class for at least the book value. First, we check mechanically the things necessary to be done to make the vehicle suitable for further satisfactory and economical service, and estimate the cost of same. Then we compare this with the carrying charges on a new unit for the first year, as follows:

First cost—$850	
Depreciation first year	$442.
Interest first year	51.
Carrying charges (total)	$493.
Repair old unit (estimated)	$250.
Profit or loss on trade	0.
Total	$250.00
Carrying charges (old truck)	55.26
Total carrying charges	$305.26

On this basis it would be more economical to repair and run the old truck —F. L. FAULKNER, *Automotive Department, Armour & Co., Chicago, Ill.*

Cars Traded at 50,000 Miles

We do not have a set rule as to when we shall trade our trucks or commercial cars, but we do trade commercial cars the first year if they have covered from 45,000 to 50,000 miles. It is much cheaper to trade a car showing this mileage than it is to have it repaired.

On cars not showing the above mileage the first year, we trade them according to their condition and after they have covered a certain number of miles; i.e., after they have been driven from 50,000 to 55,000 miles whether it be in two or three years. This is found to be more economical than having them repaired.

We use a straight percentage method of figuring depreciation, based on the original cost of the unit. This is figured each month.

A truck should not be depreciated in direct proportion to its mileage. In our operations we have trucks that only cover from 6,000 to 8,000 miles a year, and if we depreciated these on a mileage basis it would be a lengthy procedure. And after two years the truck would be worth less than our book value would show.—R. P. MIRO, *Ballard & Ballard Co., Louisville, Ky.*

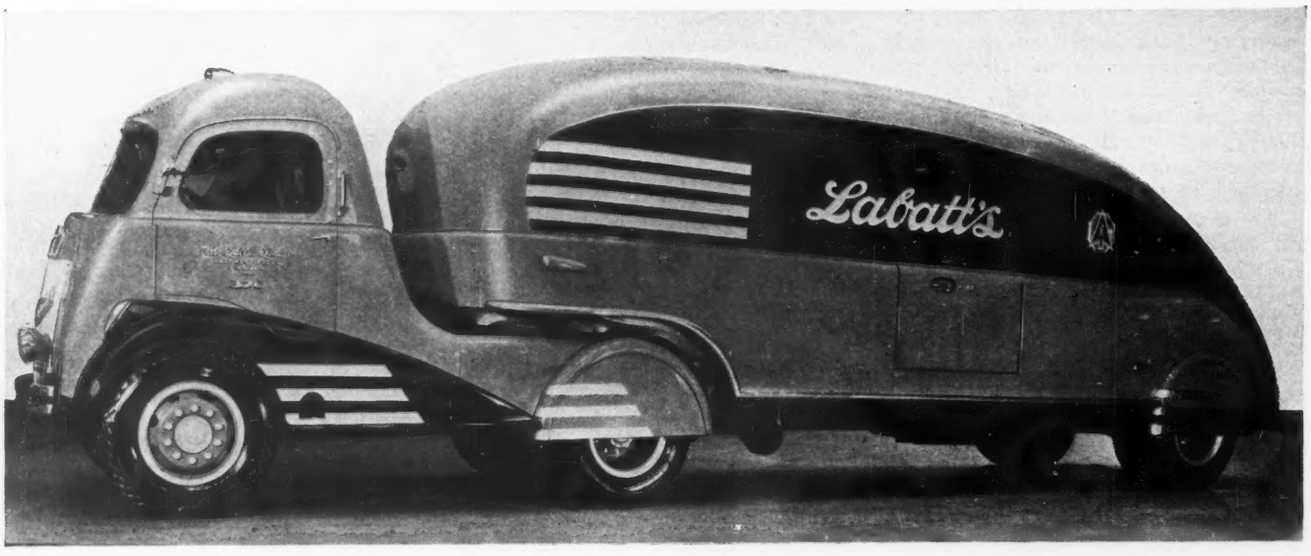
Depreciates by Percentage

It is not cheaper to trade in a truck or commercial car than to repair it at the end of a year. The trade should be made when repair costs become heavy and the results of repairs are doubtful.

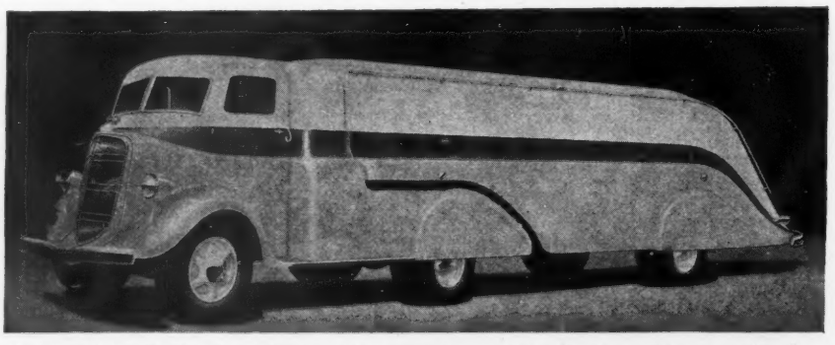
Heavy trucks, of 2 tons or greater capacity, are depreciated at a rate of 12½ per cent a year, while the depreciation rate on cars and light trucks is 25 per cent annually. It is not advisable to depreciate trucks in direct proportion to their mileage.—W. A. FREEMAN, *Furnas Ice Cream Co., South Bend, Ind.*

ADVANCED STREAMLINING
Shows Operating Savings

Canadian brewer finds economy and advertising value in new tractor-trailer



Painted a brilliant red with gold-leaf lettering, this ultra-modern streamlined White tractor and Fruehauf trailer carries Labatt's beer between Toronto and London, Canada. Aside from its advertising value, the combination made 10 miles per hour greater speed and used 9 per cent less gasoline on the 125-mile run than with conventional tractor cab and round-nosed trailer.



Developed by Fruehauf engineers, this example of advanced streamlining provides a maximum closure between the tractor cab and the semi-trailer nose. The cab extension is formed to the same contour as the trailer nose. The fifth-wheel is so located that the tractor can turn to a 90-deg. angle with the trailer without interference.

STREAKING ALONG the open road between London and Toronto, Canada, the tractor-trailer combination pictured above is the cynosure of all eyes. Its owners claim it is five years ahead of its time.

A closer inspection of the unit indeed indicates that there is nothing quite like it in the field of commercialized motor transportation. It is the present-day peak in truck streamlining. It goes farther than any previous attempts along these lines as recorded in these pages since the description of the streamlined tank truck in FOOD INDUSTRIES of July, 1936.

Most attempts at truck streamlining in the past few years have had as their aims beauty and advertising value. The Labatt job is, according to test, more economical than a similar unit of conventional design. It is the result of a year's test with four streamlined trucks bought from White Motor Co., Cleveland.

The idea originated with Hugh Mackenzie, comptroller and sales manager of John Labatt, Ltd., brewers of London, Canada. He wanted something different and got it. Well-wishers told him that it would cost

too much and would be a luxury without practical value.

He felt certain that the advanced streamlining would be worth the extra cost in increased advertising value for the company's product. He was not so sure about the unit's economy as compared with a conventional outfit of the same load capacity. And so to find out, he arranged for a test of two White tractors and trailers, one of present day design and one like that pictured herewith. Both tractors were of the same model, and both trailers carried the same payload.

They started out together on the 125-mile run from Toronto to London and headed into a 15-mile-an-hour wind. The streamlined unit arrived in London using 9 per cent less gasoline and averaged 10 miles per hour greater speed than its conventional mate.

"But now," says Mr. Mackenzie, "when common sense tells us the streamline design gives increased efficiency; lower cost of operation, and added prestige to the Labatt name, it is no longer a luxury. Radical streamline style in our trucks is now an integral part of our transportation system and is to be made standard on all our future vehicles."

Of course it is to be noted that the economy secured was obtained under ideal conditions—a long run at relatively high speeds, 42 miles per hour. It is doubtful that such economies could be duplicated on short runs at relatively low speeds and many stops. However, the greater beauty and advertising value of the ensemble remain unquestioned. While considered radical today, it may be the commonplace of tomorrow.

The finished design is from the board of Count Alexis de Sakhnoffsky, White's exclusive body and truck stylist, who was given free rein in his work. One of four of the new units ordered is on display at the Great Lakes Exposition in Cleveland, Ohio. The basic units of the combination are a Model 812 White cab-over-engine tractor and a Fruehauf trailer. The body was built by Smith Brothers of Toronto.

The overall length of the combination is 35 ft. It weighs 17,000 lb. empty and 35,000 lb. gross, the limit under the Province of Ontario law. The payload is thus 18,000 lb. This is sufficient for a load of 85 half-barrels of beer or an equal weight of beer in cases. The space capacity of the trailer is 650 cu.ft., approximately the same as that of the conventional round-nosed trailer. The streamlined trailer is 2 ft. longer than the former to offset the contours of the front and rear of the body.

Doors are provided on both sides, and there is also a door set in the rear of the body. No extra facilities are required for loading or unloading, although a longer platform, or plate, is employed to span the space between the lower sill of the rear door and the loading platform.

The bodies are neither refrigerated nor insulated. The roof and side panels are made of aluminum, with the latter lined on the inside with wood veneer.

In design, the contour of the conventional over-engine cab of this unit is sloped downward and backward to become almost parallel with the front line of the trailer nose. Just enough space is allowed between the two to permit the trailer to swing on its fifth-wheel without striking the cab in making turns. Air-brake hoses between the tractor and trailer are concealed in the tractor shrouding, which extends outward and downward to meet the rear tractor fenders. These fenders and those on the semi-trailer are provided with side wheel covers.

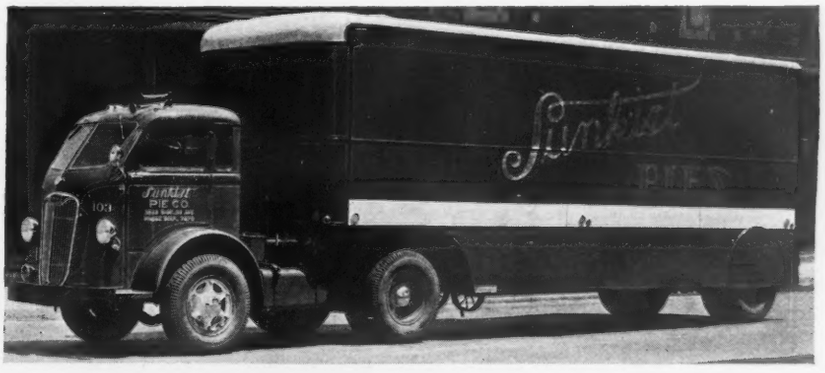
Aside from the rounded roof line, the trailer body is distinguished by the nose and tail contours.

The tractor and trailer are painted in two tones of brilliant red. The lettering and horizontal lines on the trailer and on the front and rear fenders of the tractor are in gold leaf, 27 books of which were used.

Hauls Pies *by the Thousand*

KEEPING GOOD COMPANY with the ultra-modern designs pictured on these two pages, the more conventional trailer shown below carries several thousand pies for the Sunkist Pie Co., Chicago. It has a special body 28 ft. long and 7 ft. 4 in. high on the inside.

Lined with lightweight plywood and equipped with dust-proof ventilators and rear doors, the body keeps the contents clean and sanitary under all delivery conditions. The ventilators in the rear doors are fitted with small fans to draw the warm air out of the body. The tractor is a short-coupled Autocar, and the trailer is a Trailmobile.



Pies by the thousand are moved with the tractor-trailer combination shown above. The tractor is an Autocar. The trailer is a dropped-frame Trailmobile with a deluxe Highland body with lower skirting and rear-wheel covers.

Chemists Need Salesmanship . . . Management Needs Understanding

TOO MUCH TIME elapses between the generation of new ideas in the plant and their comprehension by the management, whether the ideas are ultimately adopted or not. This is particularly true of ideas coming from the laboratory staff, especially in plants where only one or two men are doing scientific work for the company.

In altogether too many such plants the chemist is regarded as a sort of flunky—a guide for the sightseer. Naturally a good chemist is a far better guide and a whole lot better companion than some of the professional guides whose job it is to conduct the gaping yokels through the works and impress on them the fact that "none of our products are ever touched by human hands."

How well do we recall a so-called guide who escorted us around a big plant—a job he had held for eighteen years—yet he was unable to tell us anything we wanted to know. It all ended up by our telling him a great deal more than he would admit knowing about his own company's business. Obviously in such a case a chemist would have been a far more acceptable guide than a man who insisted that we should be duly impressed by automatic box-sealing machines, bottle labelers and spiral case conveyors.

But that sort of work is not a chemist's job except in very special cases. As a rule the chemist is, by inborn temperament, a very modest, even retiring sort of chap. Often lacking that bluff and hearty quality that characterizes the salesman, he finds it difficult to spring a pat phrase on his boss that will genially explain his annoyance at finding his labor interrupted to be the white-coated window dressing — the "front," if you please, for the company.

To make a flunky out of a chemist is to use a chisel for a screw-driver. It would pay some executives handsomely to study their laboratory staffs, to get to know them well, and try to understand what they are thinking and doing. Which is not to minimize the woeful inability of some technical men to explain their activities or to write a report that even a busy and impatient executive can read *and understand.*

For instance, there is a recent case of an idea of fundamental importance to the business that has taken six long years to go 30 ft. from the laboratory to the manager's mind. And it isn't comprehended yet! Six years ago the chemist tried to explain it verbally, but the manager dismissed the man with a request that he write a report on it. Then promptly the report was filed, where it remains to this day.

In this instance, the chemist continues to act as a high-priced guide for the occasional visitor, and is becoming discouraged over his own future. To his intimate friends he confides his belief that the management does not want him to be anything more than a mere living symbol of purity. On the other hand we happen to know that right now the company is somewhat on the defensive over matters that are contained in that report in the manager's file.

Chemists must learn to be better salesman of their wares; yet management must learn how to use their scientific workers to better advantage. To deprecate a man in the laboratory as visionary and impractical when one cannot even understand what he is driving at, does not solve the problem nor bridge the gap. Only a mutual understanding—a meeting of the minds—can do that. It is worthy of an unusual effort on the part of management to become intimately acquainted with their laboratory staff, for frequently the staff needs direction on economic matters that affect the business. Both laboratory and management can gain vastly by such contact, but the initiative must come from the management.

Also it is a worthy effort for laboratory men to try to learn the rudiments of salesmanship—how to present a new technical idea in logical manner, in simple language — how to use terse phrases in short sentences without long qualifying clauses. In short, how to communicate an idea to a superior.

LIKEWISE, *the chemist must learn the need of repetition, of going back at the boss, time after time, until he comprehends the idea thoroughly.* It's pretty hard to say who is at greater fault in the matter of the six-year delay in getting the idea to the boss from the laboratory. Without question, both must share the responsibility.

To Avoid Misinterpreting Public Opinion

CURRENT INDUSTRIAL HISTORY is something of a duplication of the political history of last autumn. At that time conservatives misjudged the political tempo of the times. But their failure to read the signs of the times correctly was no worse than the failure of many personnel managers today to know what is going on in the minds of their workers in many large concerns. In some places we have seen the head of the company to be better informed than the professional personnel man. In others we have seen the head man seriously misled by dependence on the faulty fact-finding ability of the industrial relations department.

To expect the department to render an adverse judgment on its own work is almost to ask for the superhuman. Yet this is what is required if the industrial relations department should need to report that all its efforts in the past have come to naught—that the majority of workers are actually anti-company instead of pro-company.

Hence, too pleasing reports coming from the labor relations department should be regarded with healthy skepticism. Perhaps very good news should be supplemented by an outside check up. In making such a suggestion we have no one food concern in mind. Most of the foregoing errors of appraisal have come in the heavy industries where outsiders easily ascertained the facts of which management was in complete ignorance. But it is wise to be wary of misinterpretation of public opinion.

LEST YOU FORGOT

Recent figures issued by National Safety Council show that much remains to be done in the reduction of accidents in food-processing plants. Increased safety can be accomplished in various ways, but safer workmen is perhaps the most effective single method. How to get these is described in "Matching Men and Jobs," FOOD INDUSTRIES, June, 1934, page 252.

How to Prevent ACCIDENTS

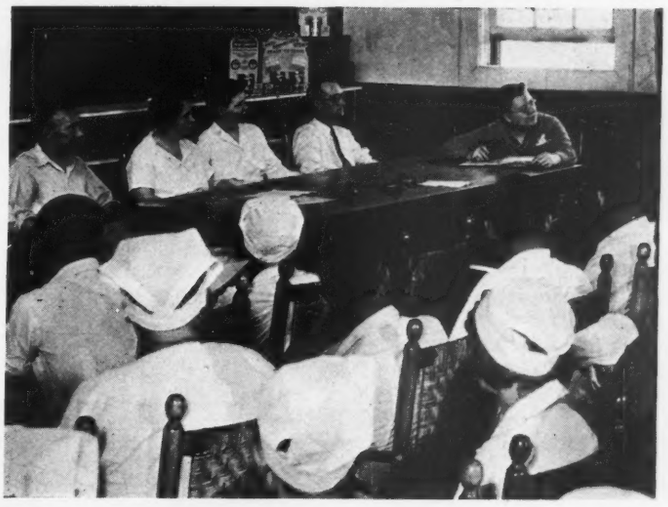
YEARLY SAFETY RATINGS of individual companies are significant only in that they indicate either the existence or the lack of an effective accident prevention program.

The truly important point in any such program is whether it is launched bombastically and permitted a quick death with indifferent results or developed systematically and supported by the company management for the long pull with cumulative benefits.

When set up for the long time results it will get, the program must follow some procedure to stimulate employee support and achieve the lowering of the number of accidents as well as of their severity.

Gradual realization of the benefits to be gained from accident prevention has caused forward-looking companies to regard funds spent in accident prevention work as investments instead of just "more expense."

In this as well as in the August number of *Food Industries* are letters from individuals in representative food manufacturing companies outlining the procedure followed by their respective companies to prevent accidents among their employees.



Employee meetings promote safety.

Has Well Organized Safety Program

Our system for accident prevention is as follows:

1. A Safety Committee made up of superintendents and foremen, which meets monthly.

2. A full-time safety inspector whose duties are to carry out the recommendations of the safety committee, and to devote his energies to accident prevention.

3. Regular factory inspections by specialists from without the company.

4. A program of safety education in the form of periodic letters to employees and a continuous display of safety posters on factory bulletin boards.

5. Insistence by the management that employees do not clean or repair machines while in motion, that they wear safety goggles when exposed to flying particles and that they observe similar common sense precautions.

6. Membership in the National Safety Council.

Officers of the Safety Committee are a president and a secretary. At the regular meeting each lost-time accident of the preceding month is discussed and analyzed in full detail, recommendations are made, and proposals voted upon.

In the past we have conducted interdepartment safety contests with certificate awards but have abandoned that program because the degree of risk in all departments was not comparable. We tried rating our departments on an equitable basis but the complications of the system defeated its purpose.

Some years ago we obtained successful results with a committee of five safety inspectors who met once each month, visited each department and made recommendations. Now, we find that one full-time inspector in cooperation with each foreman fixes responsibility more directly. We feel that our foremen are at least partly responsible for many of our accidents and that by seeing that they share this responsibility we endeavor to keep them ever alert for accident possibilities *before* the accidents happen.

We regret to say that simple means of protection to the person, such as wearing goggles, must be emphasized by applying time-off penalties for failure to observe. This is another way of saying that our most difficult task in safety work is to prevent preventable accidents.

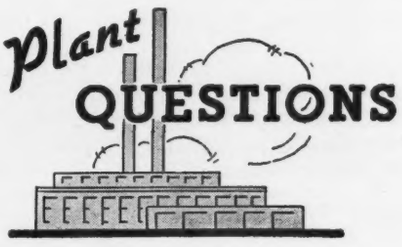
We believe that, if employees are taught to feel ashamed of having accidents, accidents due to carelessness will be reduced. Until we have eliminated lost-time accidents we will not feel satisfied with our safety work. We also believe that as long as we are not satisfied we will continue to progress toward the elimination of accidents.

To minimize the amount of damage done by accidents we have taken the following steps:

1. Maintenance of a well-equipped dispensary with a registered nurse on duty. No matter how slight the injury the employee is required to report at once. A record of all cases is kept.

2. Ready availability of the company doctor and the hospital for the more serious cases. Stretchers are placed through the factory and an ambulance can be at the factory doors in less than five minutes. We are fortunately placed in that our hospital is across the street from the factory.

3. A certificate from the doctor is required before employees are permitted to return to work after being hurt.—S. F. HINKLE, *Hershey Chocolate Corp., Hershey, Pa.*



Trains New Men on the Job

We rely chiefly upon personal instruction of new employees. Following this procedure, it takes a little longer to break in new employees to our safety measures; but we find that we have fewer accidents by using this method of training than by any other method.

Our plant superintendent is responsible for the accident prevention measures and gives this training program his personal supervision and frequent check up.

We believe that there is nothing like training on the job.—HAROLD HALL, *J. R. Short Milling Co., Chicago, Ill.*

The PLANT NOTEBOOK

Boiler Continuous Blow Down

Continuous blowing of boilers is a development of recent years. It has resulted in better operating performance and for that reason is coming more and more into general use. It is especially recommended for boilers using a large percentage of make-up water, as is the case in many food plants where steam is used in processing.

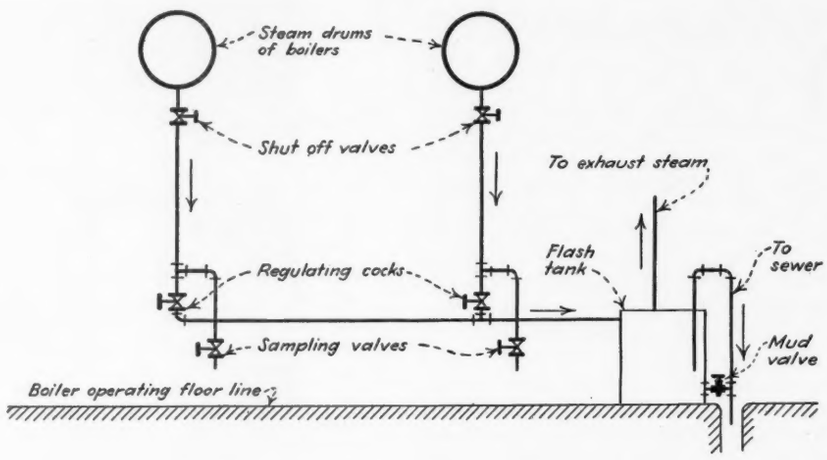
Assuming that the raw water contains 10 grains per gallon of impurities, if the make-up is 50 per cent each gallon of water going to the boilers will carry 5 grains of solids. This is a small amount but since it is left in the boiler while the water is evaporated, a 500 hp. boiler after only 24 hours of operation will accumulate about 50 lb. of mud. Some of this may be deposited as scale but the majority will remain in suspension.

If the boiler is not blown, the impurities will be increased at the rate of 50 lb. per day and as the concentration is increased there will be an increasing amount of solids carried by the steam until an equilibrium is established. Thereafter, as much solids will be carried out by the steam as is brought in by the water. With the steam carrying 50 lb. of solids per day it becomes a miniature sand blast, damaging valve seats, engine cylinders and other equipment, as well as depositing solids on the heating surfaces with which it comes in contact, thus impairing efficiency.

It is not likely that a boiler will not be blown at all, but it is a fact that if a boiler is blown blindly it will not be blown sufficiently and the condition described in the preceding paragraph will be true on a smaller scale. By blind blowing is meant when the operators do not know the concentration of the boiler water as determined by actual test. Boilers so operated may carry a concentration of over 1,000 grains per gallon, as I have noted in the case of certain boiler plants that have come under my own observation.

Some boilers are being operated apparently satisfactorily with 200 or 300 grains per gallon, but there is a tendency among engineers to keep the concentration around 100 or even 50 grains. In the case that I have assumed, with feed water containing 5 grains per gallon, to maintain a concentration in the boiler of 100 grains, the blow down required is 5 per cent. If none of the heat is recovered this represents a loss in the blow down of about 2 per cent.

The principal object of a continuous blow down is to recover this loss but it also has other advantages which might be even more important. These are: (1) Relieves the operator from this duty. (2) Eliminates the interruption of the uniformity of operation caused by the requirement of larger amounts of feed after a blow down. (3) Makes the blowing down systematic and considerably less likely to be neglected.



Continuous blow down system without heat exchange.

A continuous blow down system consists principally of a flash tank and a heat exchanger, each one recovering about half of the heat of the blown water. But because the heat exchanger element is rather expensive and requires the changing of the feed water piping in equipment already installed, its economy is questioned except in new plants and even in such it is sometimes omitted.

A continuous blow down system without a heat exchanger is shown on the diagram. The material needed is a tank, sufficient piping and the necessary valves. Water is withdrawn from the steam drum and the amount controlled by a cock on the operating floor. The piping should be of small size so that in case the control cock is accidentally left wide open the water withdrawn will not be excessive, but some engineers prefer to use a larger pipe size with an orifice. Sampling lines should be provided and the cock adjusted so as to maintain the approved concentration. In the tank, part of the water flashes into steam and this is piped to the exhaust heater or open heater while the water is discharged to the sewer through a water leg which automatically prevents the escape of the steam.

A continuous blow down system makes the maintenance of low concentration in the boiler easy and permits the recovery of the heat, which is not possible with hand blowing. The saving from the heat recovery should pay for the equipment in a very short time, while the lower concentration makes possible the delivery of cleaner steam. It also makes the scaling of the boiler less likely.—N. T. Pef, *Chicago, Ill.*

Maintenance Records and New Equipment

All progressive firms have some method of providing for the purchase of new and better equipment as it becomes available. It is chiefly by that very token that a firm may be rated as progressive. However, it is doubtful whether all selections of new equipment are efficiently balanced as against the old. For instance, of two machines or other pieces of equipment in a given plant, one may have a maintenance charge against it which mounts higher and higher, while another requires only a very moderate amount of maintenance. This is a factor that should certainly never be overlooked. The equipment with the lowest maintenance cost per unit of work produced should certainly be left on the floor as against the equipment that is more wasteful in this respect, provided that other things are equal.

In order to really know the facts with reference to maintenance, some sort of records are necessary that will accurately furnish a maintenance history on each piece of equipment. This can be very efficiently done by means of a card index kept by the maintenance engineer. All costs of all ma-

terials requisitioned by him should be passed on to him by the buyer, if he does not do his own purchasing. It is better for him to keep the record personally, than to pass it on to clerks.

When each piece of equipment is given an equipment number, and there is a card of corresponding number in the engineer's index, it is a simple matter to write down briefly on the card the nature and the cost of each repair made to that item. Then, when the day comes for the purchase of a new piece of equipment and the discarding of an old one, there need be no guesswork as to relative maintenance costs between different, though similar, pieces of equipment. — JOHN E. HYLER, *Peoria, Ill.*

Extending Concentrated Ingredients

As with clerical work performed by the average factory worker, speed and accuracy suffer when he is called upon to weigh out small quantities of concentrated raw materials for his batches. Usually these materials can be extended in one or another of the other ingredients. Thus in place of grains or grams he can weigh out ounces or instead of ounces and fractions he handles pounds and ounces.

A case in point is vanillin and/or coumarin. If a batch calls for 5/8 ounce of vanillin it can be extended in powdered sugar in a mortar or for large quantities made up in advance, in a ball or pot mill. Five ounces of vanillin may be rubbed up in a mortar with 45 oz. of sugar or as many pounds handled in a pot mill. The operator then reads in his formula and weighs up 5 oz. Vanillin S.F. (semi-finished) into his batch and accuracy is increased at least ten-fold.

If coumarin in the usual ratio of one to five is in the formula the "semi-finished" is made up of 5 vanillin, 1 coumarin and 44 sugar. The operator still uses 5 oz. S.F. in his batch instead of laboriously weighing up 5/8 oz. vanillin and 1/8 oz. coumarin.

These simple figures extending the materials ten times were used for ease of illustrating. Obviously, odd figures such as 1 7/8 oz. of vanillin and 7/16 of coumarin can be extended so that the worker can use 8 oz., a pound or other convenient quantity.

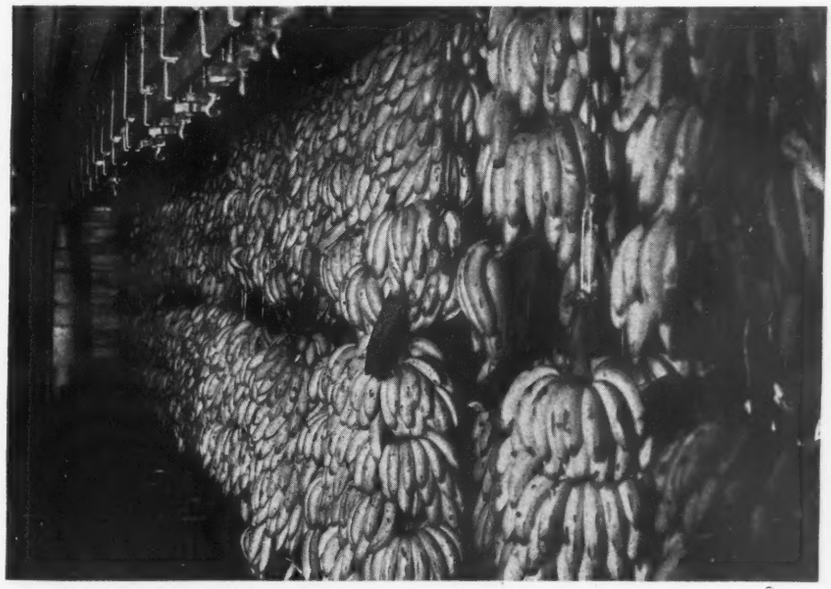
Ramifications of this idea are many. Among them are extending U.S. certified colors in cornstarch or sugar. Where "artificial color" is to be avoided such as in a dry pudding or pie filling mix using caramel color, the viscous caramel may be intimately mixed with cornstarch, dried and subsequently powdered. Likewise, artificial concentrated liquid flavors can be extended in anhydrous corn sugar.

In dry mixes particularly and even in doughs uniform distribution of any concentrated ingredient is also facilitated—RALPH H. AUCH, *Cincinnati, Ohio.*

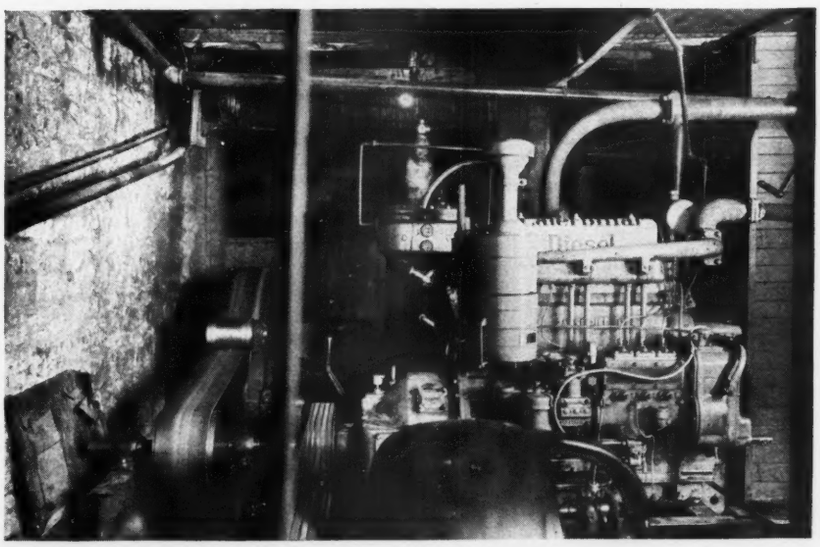
Lighting and Cooling With a Diesel

Six cents worth of fuel per hour is all that is required by a diesel engine to light and cool Hunt Brothers Produce Co., 113-115 Market Square, St. Joseph, Missouri.

This engine was installed in March 1935, with the express purpose of cutting power costs. Previously, the company had purchased power. Since its installation, it is reported that the engine has averaged a saving of $110 per month.



One of the banana storage rooms at Hunt Brothers Produce Co.



Diesel engine installed in Hunt Brothers Produce Co., St. Joseph, Mo., provides light, power and refrigeration.

The unit is a "Caterpillar" 47-hp., three-cylinder diesel. It is connected by a V-belt to a 16 kw., 30 cycle, 220 volt generator, which lights the entire building and runs three electric motors of 5, 3 and 2 hp.

The engine is also connected by a flat belt to a 10 ton, 6½x6½ in. ammonia compressor. The refrigerating plant cools three banana storage rooms, the largest of which will hold 340 bunches. In addition, three smaller cold storage rooms are handled.

Running in a damp basement, where air conditions are unusually poor, the engine works fourteen hours per day and consumes 1 gal. of 6 cent fuel per hour—a daily fuel cost of 84 cents.—*Source of information, Caterpillar Tractor Co. Peoria, Ill.*

New DISCOVERIES AND INVENTIONS

METHODS OF PRESERVATION

Comparison of Methods Of Freezing Foods

AN EXPERIMENTAL COMPARISON has been made of the Heckermann process (freezing in a rapid current of chilled air and storing between refrigerating coils), the Birdseye process and the simpler method of freezing in still air in open containers. The tests were made with strawberries, raspberries, currants, gooseberries, peaches, plums, sour cherries, beans, cucumbers and lettuce. No one of the three methods proved superior for all purposes, but lettuce failed to give good results by any method.

In most cases the maximum safe storage temperature is lower than 16 deg. F. (which is sometimes recommended), but cucumbers kept excellently at this temperature. Another experimental temperature employed in this investigation was —11 deg. F. In most cases the maximum safe temperature lies between +16 and —11 deg. F., but with beans and peaches this temperature seemed necessary. The Birdseye process, with storage at —11 deg. F., was far superior to the other two processes. To avoid loss of flavor, beans must be blanched before freezing. In general, the Birdseye process is superior for fruits which need cutting or blanching before freezing. A special merit of the Heckermann process is optimum efficiency in utilizing a given refrigeration installation, while the simpler method of freezing and storing in large containers has an economy advantage.

Digest from "Comparative Studies of the Freezing of Fruits and Vegetables," by K. Paech, *Chemiker-Zeitung* 61, 537, 1937. (Published in Germany.)

The "Intermat" Process for Preserving Liquid Foods —Another Matzka Process

AN ELECTRICAL AND OLIGODYNAMIC TREATMENT for preserving milk, beer, fruit juices, egg white and other liquids from spoilage has been developed in France. As disclosed in French Patent No. 810,127 (granted March 15, 1937, to Societe Anonyme Compagnie Internationale Matzka "Intermat"), the liquid is caused to flow over the surfaces of a series of electronegative metals (e.g., silver or any of the noble metals) and electropositive metals (e.g., nickel or aluminum). The electrical potential should not be greater than about 1 volt or, at most, 1.5 volt.

One of the metals to which the liquid is exposed must possess oligodynamic germicidal properties, a requirement which is fulfilled by silver. At the same time that the liquid is being exposed to the electric potential between the positive and negative metals, it is also subjected to mechanical or thermal shock. This may be done with a vibrator, or by heating some of the metal surfaces so that the liquid as it flows is suddenly heated or cooled. The temperature gradient from one metal surface to the next may be 15 to 20 deg. C. (27 to 36 deg. F.), but in no case should any of the metal surfaces be heated above 80 deg. C. (176 deg. F.).

PREPARING RAW MATERIALS

Freezing, Then Shelling Whole Grain Corn Instead of Cutting

FREEZING OF SWEET CORN in order to shell it from the cob is a new step in quick freezing method of preserving, or preparing it for canning.

Preparation of ear corn for the method described in U.S. Patent No. 2,085,051 consists: 1. of plucking the ears when the corn is at best stage of maturity to have maximum sugar and minimum starch content to give best flavor and good eating qualities; 2. cleaning the ears of husks, silk, and defective or damaged portions.

In its simplest form, the freezing is done at 0 to 10 deg. F. in a circulating bath containing about 200 grams sodium chloride in 1000 cc. of solution. The ears are in the bath sufficiently long to assure complete freezing of the individual grains. The ears are then run rapidly through a standard mechanical corn sheller for removal of the whole grains from the cob.

After shelling, the grains are washed in water for the removal of chaff or particles of broken cob and major portion of the adhering salt solution. This washing is preliminary to packaging of the grains in a frozen state or to filling into cans, preheating, sealing, and retorting in the conventional manner.

In a less simple way, the freezing may be carried out in a solution of sugar or of sugar and salt mixture or by the use of any gaseous, liquid or solid refrigerant which will not injuriously affect the natural good-eating qualities of the corn. Also the adhering refrigerant may be left on the grains to aid in their preservation and to add to their palatability when finally cooked for eating.

When desired the removal of the husks, silk, and defective portions may be done after instead of before freezing.

The patent was granted June 29, 1937 to Robert B. Taylor, Knoxville, Tenn.

VITAMINS

Vitamin Enriched Foods

FOOD PRODUCTS which are rich in enzymes and vitamins are made by treating yeast with ethyl acetate to destroy the yeast cells but not the yeast enzymes. The solution in which this treatment is carried out must be slightly acid, and the temperature must be kept below 120 deg. F. (preferably at blood heat, about 98 deg. F.). The treated yeast, as described in British Patent 450,529 (granted Oct. 15, 1936 to C. Weizmann), may then be used to enrich soy bean flour, brewer's grains and other cereal products in vitamin content.

The action of the yeast preparation on the soy bean flour or cereal grain has the effect of hydrolyzing the proteins contained in these materials. The enzymes of the yeast, which are not rendered inactive in the original treatment of the yeast with ethyl acetate, serve to accelerate the protein hydrolysis. The new method yields soy

bean or cereal powders which have an agreeable taste and a high vitamin content. Only a little ethyl acetate (about 5 per cent of the yeast) is needed for destroying the yeast cells to obtain the vitamin-rich treated yeast.

Vitamin C in Spuds

THOSE WHO WANT TO KNOW what happens to Vitamin C in potatoes when they are being cooked by various methods in the home will be glad to know that not more than half the vitamin is lost in cooking. Frying does the most to Vitamin C, of the nine methods of cooking, boiling and steaming seems to do the least.

Digest from "Vitamin C Content of Potatoes Prepared for Table Use by Various Methods of Cooking." By Richardson, Davis and Mayfield, *Food Research*, 1, 85, 1937.

BEVERAGES

Vitamin-Enriched "Beverages"

STABLE VITAMIN PREPARATIONS to be incorporated in "carbonated beverages" are made by incorporating a vitamin concentrate with the acid component of the carbonating system. As the invention is described in British Patent No. 459,467 (granted April 1, 1937 to Nyegaard & Co., Aktieselskapet, Oslo, Norway), a solid acid such as citric or tartaric acid or sodium acid phosphate is used for liberating carbon dioxide from sodium bicarbonate and the vitamin concentrate is incorporated with this solid acid before it is brought into contact with the bicarbonate.

For example, a vitamin-enriched fruit extract in alcoholic solution is added to tartaric acid and the mixture is evaporated to a pasty consistency, after which it is dried in vacuum at 40 deg. C. The mass should be stirred during the drying operation, and should be kept in an inert atmosphere then and also for subsequent storage. When the beverage is to be carbonated, the addition of the vitamin-enriched concentrate to the bicarbonate for liberation of carbon dioxide is also carried out in an inert atmosphere (either carbon dioxide or nitrogen). This serves to prevent decomposition of the vitamin. With the added protective effect of the acid in the preparation the vitamin component is very stable.

CONFECTIONERY

Cellular or Foamy Confectionery

A CONFECTION is made of chocolate, or any other suitable fatty base which can be melted or softened at temperatures near the boiling point of water, by imparting a cellular structure to the base material and incorporating therein nuts, raisins or the like as desired. As disclosed in British Patents 459,582 and 459,583 (granted April 12, 1937 to J. W. Todd and Rowntree & Co., Ltd., York, England), the fat may be chocolate, cocoa butter or the like and the cellular structure is imparted by melting the fat, aerating it in a centrifuge or other machine to introduce many fine bubbles, and enlarging the gas bubbles without allowing them to escape.

Any suitable means may be employed for reducing the pressure to enlarge the bubbles, but the preferred method is sudden cooling of the melt so that escape of the bubbles is effectively prevented by the film of solid fat forming at the surface. The structure of the confection may be preserved by embedding it in a layer of non-cellular fat or other edible material, or simply by a foil or paper wrapper.

FISH AND MEAT

Edible Gelatin

IN MAKING FOOD PREPARATIONS from animal proteins (edible blood or gelatin, or egg albumen), the protein is coagulated from its water solutions by adding a solvent which will dissolve water but not the protein. To make edible dried blood, the fresh blood is coagulated with alcohol or acetone and drained. The coagulum is washed with ether to remove entrained alcohol and any water that may remain, and the ether is allowed to evaporate from the residue of dry blood.

For gelatin preparation, a water extract of bones is chilled on a rotating cooling drum till a gel is formed. The drum is partly immersed in alcohol so that, as the layer of gel passes through the alcohol, part of the water is removed and the gelatin is easily stripped from the drum for washing in ether and drying. As the invention is described in Britsh Patent 457,831 (granted Feb. 25, 1937 to S. Morris of Crossmyloof, Glasgow and W. Acton of Paisley, Scotland), the method must be modified somewhat in preparing dried egg, by mild acidification or alkalization of the protein, whichever is needed, to keep the alkalinity or acidity safely away from the isoelectric point of egg albumen during the coagulation. Otherwise the sequence of solvent treatments is the same as for blood or gelatin.

Twenty-nine Methods Of Preventing Spoilage Of Sausages

THE KEEPING QUALITIES OF SAUSAGE have two very different aspects, one involving resistance to spoilage and putrefaction and the other involving the less tangible matters of flavor, aroma, color, texture and other properties known collectively as the "organoleptic" factors of quality. Scrupulous cleanliness in manufacture, mild grinding in presence of air, and low water content tend to prevent bacterial spoilage, but are likely to favor mold growth. Well dried salami, properly prepared, has the best keeping qualities among the sausages. Drying out during storage weakens flavor, and free access of air toughens the sausage.

The best packing medium for shipping well dried sausages is clean, finely chopped oat straw. A study has been made of 29 methods for protecting sausages. They include the application of protective coatings (fats, waxes or the like), sealing in gelatin-lined cans, wrapping in transparent foil, keeping in brine, treatment with disinfectants or with ultraviolet rays, and packing in various dry materials.

Wax coating is among the most effective treatments, but the gas evolution which occurs from freshly made sausage must be ended before the wax is applied. Thorough aeration and cooling are necessary for this purpose. An important observation is that favorable biochemical changes occur in salami and other sausages if they are protected by an airtight wax film, and the stored sausage has better flavor than when new. Care must be taken, however, to have the water content and the fat content within the optimum range in the coated sausages.

Digest from "Properties and Keeping Qualities of Polish Sausages," by T. Chrzaszcz and D. J. Tilgner, Roszniki Nauk Rolniczych i Lesnych 38, 442, 1937. (Published in Poland.)

Fish Proteins As Good As Meat

IT HAS BEEN KNOWN FOR MANY YEARS that fish proteins approximate the food value of milk proteins, with the added merit of containing assimilable iodine which is an indispensable element in human metabolism. Recent investigations by the Public Health Department in Germany have confirmed these observations with respect to fish proteins and have brought to light some new facts. Certain changes were effected in fish proteins by alkali treatment which were manifested chiefly in greatly increased resistance to coagulation by acids, salt brines or heat. In the dry state the treated protein is extremely stable and can be kept indefinitely. In continuation of the study, digestibility comparisons were made by treating fish and egg proteins with pepsin and trypsin. Neither was found to be more or less digestible than the other. Bacterial examination revealed no toxic or putrefactive organisms in properly prepared fish proteins. From the standpoint of public diet and health, fish is quite as digestible as the meat of mammals, while in food value

(*Turn to page 544*)

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Canner's Glove

A WHITE ANODE CANNER'S GLOVE, for use in canning and food handling plants, is being made by Miller Rubber Co., Akron, Ohio. The white color has obvious advantages in plants where cleanliness and sanitation are important.

This glove is made by the anode method, which uses the original latex and processes it in manufacture to retain its natural life. It is provided with pure gum reinforcing strips on thumb, index and second fingers, affording a positive grip and additional wear.

The makers state that tests show for this glove uniformity in thickness, high strength, great flexibility and long life.

Confectionery Machine

SAVAGE BROS. CO., 2638 Gladys Ave., Chicago, Ill., recently brought out the "Sisco" nut rolling machine, designed for rolling centers, that have been dipped, in coconut, ground nuts or nut halves. It can be used in connection with an enrober or with hand dipping.

In operation, the top hopper is filled with the coconut or nuts. From there, the material is deposited on an angle belt. Upon reaching the top of this belt, it drops onto the first of a series of rolling belts. As the machine is continuous in operation, the material continues to pass from one belt to another until all fourteen rolling belts have been covered.

The surplus nuts or coconut, upon reaching the last belt, fall through the wire belt onto the return belt, an endless belt running beneath all fourteen rolling belts. This return belt brings the surplus to the bottom hopper, from which it is deposited on another endless belt having channels fixed to its surface. As the channel belt moves around, it conveys the surplus material back to the angle belt, thus completing the cycle.

When all belts are covered with the material, centers are delivered from the enrober on to the angle belt. They move forward on this and receive a covering of nuts or coconut as they pass under the top hopper. Then they are delivered to the first rolling belt.

The rolling belts are set on an angle so that the goods are carried to the top and drop to the next belt, until they reach the last or wire belt. In dropping from one rolling belt to the next, the pieces turn, dropping on a side that has not not been covered. In passing along all fourteen belts, the pieces become completely and uniformly covered.

After passing over the wire belt, where the surplus nuts or coconut drops off, the candy may be run into trays, or continued on an endless belt conveyor to the packers.

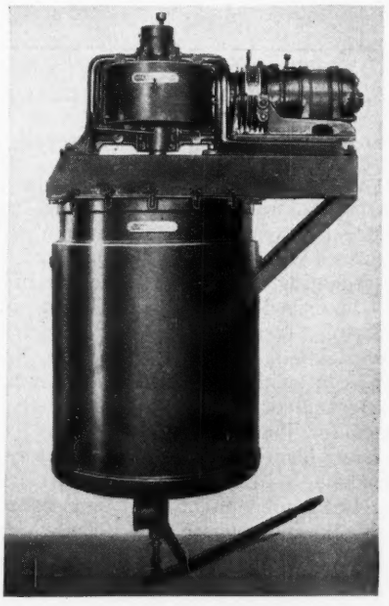
Floor space for a 24 in. machine is 17½x4 ft., with 9 ft. additional for a 16 in. enrober.

Corrosion Resisting Pump

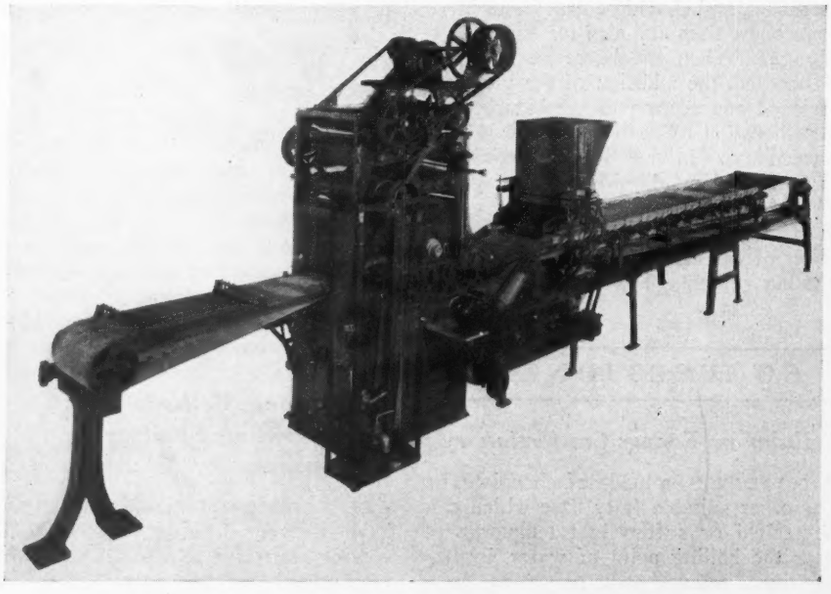
A SINGLE SUCTION CENTRIFUGAL PUMP especially designed to handle corrosive liquids, and furnished in a wide selection of alloy metals, is being produced by Lawrence Pump & Engine Co., Lawrence, Mass. It is designated "Type SC" and is of the Lawrence "Vortex" design.

Jacketed Kettles

PATTERSON FOUNDRY & MACHINE CO., East Liverpool, Ohio, has placed on the market a line of motor and belt driven kettles suitable for the manufacture of all kinds of vegetable, animal and mineral oil products, and for other process work. The entire line is built in both plain and stainless steel, as well as in



Jacketed kettle with stirrers



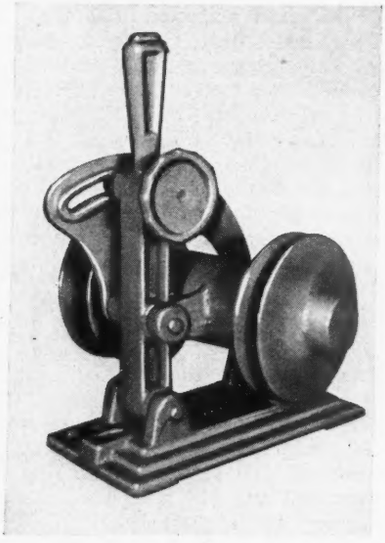
Machine for rolling candy centers in nuts or coconut

aluminum, Monel and other corrosion resisting metals.

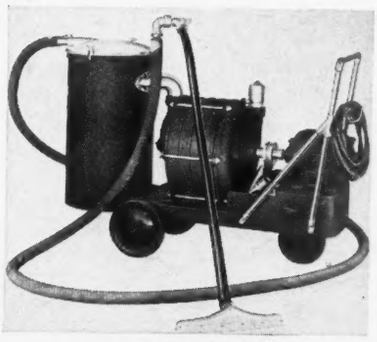
These kettles are supplied with double motion drives so that the stirrers revolve in opposite directions. The outer stirrer is usually of the scraper type, so that the sides of the kettle may be kept clean, to promote rapid heat transfer. Flush type outlet valves are used. Sizes available are from 50 to 2,000 gal. gross capacity.

Variable Speed Transmission

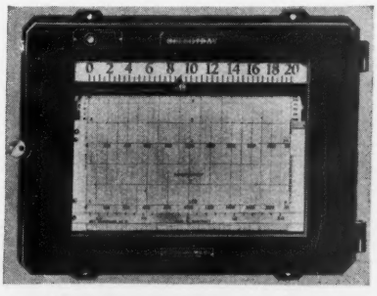
THE "HI-EFF" is a variable speed transmission made by Columbia Vari-Speed Co., Wheaton, Ill. It consists of a single shaft on which are mounted two adjustable V-belt pulleys. These pulleys vary in diameter as their distances from the driven and driving pulleys are changed. The transmission comes in sizes from ¼ to 7½ hp. It is said to offer infinite speed selectivity within the ratio of 5 to 1, and to be over 90 per cent mechanically efficient.



Variable speed transmission for V-belts.



Factory cleaning unit



Photoelectrically balanced potentiometer recorder.

Protected Take-Up

A PROTECTED SCREW TAKE-UP for conveyors and elevators is now made by Jeffrey Mfg. Co., Columbus, Ohio. On it, the adjusting screw is covered by an inverted U-shaped shield which extends the full length of the frame, keeping out dust and dirt. The sliding base casting, which carries an adjustment nut of bronze, is cored out in such a way that it slides freely over the shield, thus relieving the shield of any function except that of protecting the screw. As the screw remains always inside the frame, it is always protected from damage.

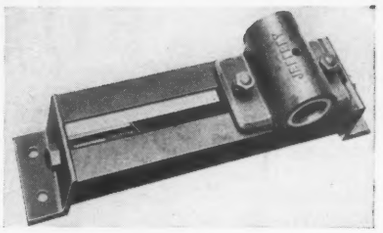
The screw is also protected from operating strains and shocks, and is relieved of all load because, after adjustment, the bearing is rigidly clamped to the frame.

Factory Cleaning Unit

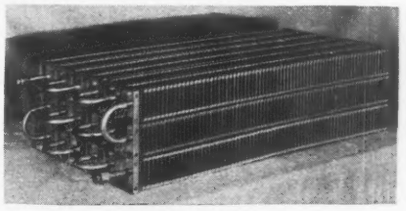
FOR PLANT CLEANING, a light weight, heavy duty portable industrial vacuum cleaner has been introduced by United States Hoffman Machinery Corporation, 101 Fourth Ave., New York, N. Y. It has a centrifugal blower for producing vacuum, with two outwardly mounted bearings. The motor is direct connected. This construction is said to give more dependable performance and longer life than would be otherwise obtained. The unit is 55x22 in., and 36 in. high. It is mounted on two fixed and one swiveling rubber-tired wheels. The motor is 1½ hp.

Photoelectric Recorder

C. J. TAGLIABUE MFG. CO., Park and Nostrand Ave., Brooklyn, N. Y., is making a new type of recorder called the "Celectray." In this recorder, a sensitive mirror galvanometer is the primary controlling element in which a beam of light takes the place of the usual metal boom or pointer. The beam of light from the galvanometer, in moving on and off a photoelectric tube, passes the "controlling edge" of a screen. This action causes the operation of relays which in turn control a reversing motor. The motor drives the moving contact of the Wheatstone bridge or potentiometer. Claims made for this recorder include great simplicity, accuracy and speed, particularly in multiple point recorders.



Protected screw take-up for conveyors.



Fin tube cooling coil

Cooling Coil

A NEW COMMERCIAL FIN COIL for application in the refrigeration of cold rooms, store refrigerators and the like, has been developed by York Ice Machinery Co., York, Pa. These coils will be tailormade to fit individual jobs. They are manufactured in fin sizes of 3x3 in., with fin spacing of ⅜ in., ½ in., and ¾ in.; also in fin sizes of 1¾x1¾ in., with fin spacing of ⅜ in., and ½ in. All coils are made with ⅝ in. refrigerant tubing. Tubing is of copper, all other parts of aluminum.

Milk Bottle Filler and Capper

EMBODYING MANY NEW FEATURES, plus the all-rotary principle of the Davis rotary filler and capper, Creamery Package Mfg. Co., Chicago, Ill., has developed its new CP No. 5 Roto-matic Bottler.

This machine is adjustable for bottles of any size and is equipped with variable speed, so that the speed best suited to the washer or the product being filled can be selected. Maximum capacity is 60 quarts or 75 pints per minute, while minimum capacity is 53 quarts or pints per minute. Floor space required is 38¼x50 in.

Milk tank is of welded stainless steel with stainless steel cover. Bottle pedestals are of nickel alloy and star wheels of nickel-plated brass.

Steam Trap

COCHRANE CORP., 3107 No. 17th St., Philadelphia, Pa., has designed a steam trap of the bucket type for straight line installation, which permits inspection and cleaning without disturbing the pipe connections. A plug at the top gives easy access to the seat. There is a positive water seal to prevent blowings. The trap is designed for pressures up to 150 lb.

BUSINESS TRENDS

Food Commodities Lower

MORE ABUNDANT CROPS have had the expected result of lowering the prices of many of the raw materials used by food manufacturers, as compared to the prices that ruled a month ago. The great exception to this general trend is found in animal products which, led by the high prices of hogs, have shown an advance.

Perhaps the most encouraging factor in the whole situation is the very definite prospect of an ample supply of all types of animal feeds for the fall, winter and spring. Prospects are still excellent for a large corn crop. Even if the actual harvest is somewhat lowered by the recent dry weather in the western part of the corn belt, it is likely to total at least a billion bushels more than last year's output. Small grains and hay are also available in good quantity.

As a result, farmers will be encouraged to feed more livestock and poultry over the winter, which will tend to keep meat scarce and dear until next spring, but will act to correct shortages later.

Milk should be available in more ample supply and at better prices than has been the case in the last two years. Production of eggs should also benefit from more ample feeds.

Fisher's index of commodity prices was 91.9 on August 15, compared to 92.5 four weeks earlier. Dun & Bradstreet's weekly food index was $2.90 on August 10, practically unchanged for the month.

As far as can be seen at present, and allowing for the effect of the large crops that are being harvested, the outlook for the early fall is for steady commodity markets, with prices a little lower than, or about the same as in the late summer.

Construction News

	Pending (thousands)	Awarded August (thousands)	Total Awarded 1937 (thousands)
Bakery	$200	$40	$854
Beverages	5,210	1,475	7,409
Canning and Preserving	258	.....	1,115
Confectionery	.....	.....	40
Grain Mill Products	1,260	1,030	3,006
Ice Manufactured	.....	.....	745
Meats and Meat Products	190	50	1,358
Milk Products	360	60	4,718
Miscellaneous	810	1,243	8,275
	$8,288	$3,868	$27,520

Cotton Oil Flood

PRESENT PROSPECTS are for a cottonseed oil crop well above normal, estimated to total 3,800,000 bbl., compared to 3,200,000 bbl. in 1936, and a ten-year average of 3,375,000 bbl. As annual consumption of domestic oil has been around 3,000,000 bbl. in recent years, the new crop promises to reduce imports of edible oils. Already the price of oils reflects this fact. However, as a balancing factor, stocks of lard are falling and hog slaughter during the next 8 months is expected to be abnormally low, with corresponding low lard yield.

One probable result of this oil-lard situation will be increasing consumption, over the next few months, of vegetable shortenings at the expense of lard.

Dairy Situation

RECENT REPORTS of the Bureau of Agricultural Economics indicate better prospects for the dairy field in the year 1937-38 than in the preceding year. Production of dairy products has increased, consumer demand is good, and prices are currently somewhat above those of a year ago. Pastures in dairy States are reported to be in good condition and feed prices are expected to go down.

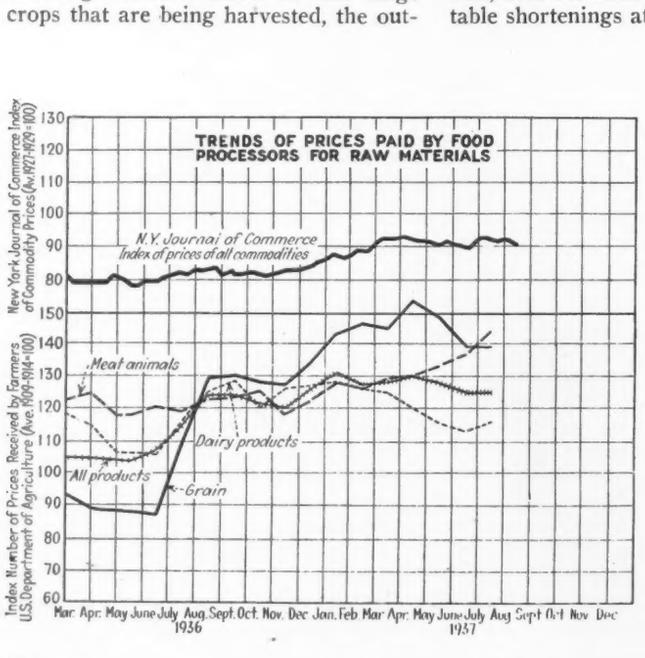
Milk production has been running about 3 per cent over the same period in 1936, and is expected to show an increase throughout the third quarter. Prices during the last half of 1937 are expected to average about as high as in the same months of 1936. Milk production per cow is now about 4.8 per cent higher than in the same months of 1936, and is the highest recorded since 1930, while the number of cows on farms is between 1 and 2 per cent lower than a year ago.

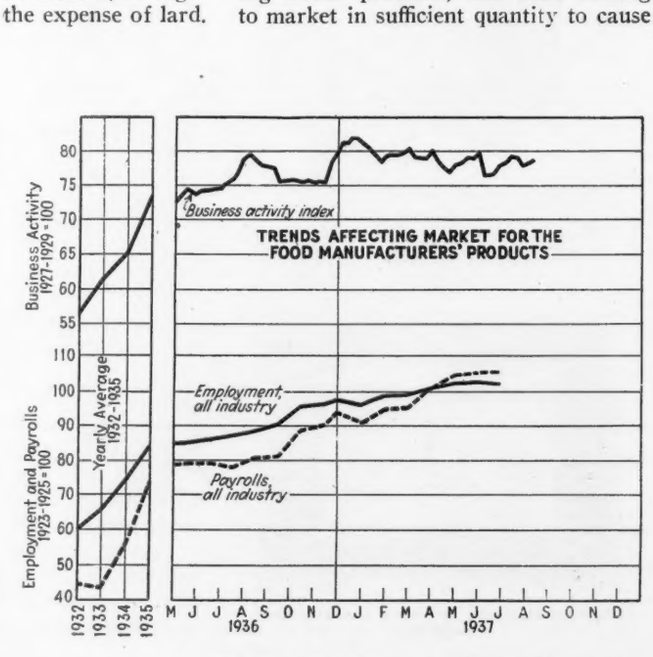
Meat Supplies Low

HOGS have been coming to market in recent weeks in quantities less than half of the marketings for the same weeks of 1936. At the same time, the price has been very high, ranging between $13 and $14 a hundred pounds, reaching the highest levels in eleven years.

Beef has also been high and the weight of beef produced by packing companies has been about 20 per cent below the 1936 production.

Lamb, alone of all important packing house products, has been coming to market in sufficient quantity to cause


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index of Commodity Prices (Av. 1921-1929=100)
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave. 1909-1914=100)
N.Y. Journal of Commerce Index of prices of all commodities
Meat animals
Dairy products
All products
Grain
Mar Apr May June July Aug Sept Oct Nov Dec Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
1936
1937



Business Looks Ahead

DURING THE MONTH the statistical position of business changed but little. Holding firmly to the level reached in mid-July, business engaged in a waiting period, watching for the effects of the bumper harvests and for the fall trade upturn. In the four weeks from July 17 to August 14 the *Business Week* index of business activity decreased by the slight amount of 0.38 per cent.

Washington-induced business jitters seem to be mending as the Congressional session ends with agricultural control put off until next year. Construction continues at high level. Steel output, at 85 per cent of capacity, is at a high point for any recent summer. Electric power consumption continues to make new seasonal records. With the 1938 auto models about to appear, the stage is well set for good early fall business.

Wholesale prices of all commodities, as reported by the United States Department of Labor, decreased 0.34 per cent in the four weeks from July 17 to August 14. For farm products this index shows a decrease of 3.95 per cent for the same weeks, while the index of wholesale food prices increased 0.46 per cent. The *New York Journal of Commerce* weighted prices indexes moved in parallel, the general index falling off 2.64 per cent for the four weeks from July 24 to August 21, while the index for grains decreased 11.93 per cent, and the index for foods fell 2.93 per cent.

the price to recede somewhat from the high point of last Spring.

Paralleling this high level of meat prices, consumer demand for meats has naturally fallen off. *Business Week,* in its August 14 number, reports recent figures showing per capita meat consumption that is the second smallest recorded in the packers' history. The same publication also reports Chicago sources as saying that the current high meat prices will continue for at least 60 days, and that it will be two years or more before the hog supply situation gets back to normal.

One noteworthy factor effecting the future of the meat supply is the apparent shifting of at least some of the hog production to the drought-free Southeast. Should such a move reach major proportions, it is likely to have considerable effect upon other branches of the food industry than meat packing.

Candy Hits Top

EARLY IN AUGUST, the U. S. Department of Commerce published a study which shows that per capita candy consumption hit an all-time peak in 1936.

The total production for the 1936 year was reported at 2,054,000,000 lb., valued at $309,291,000. This compares with a recent low point for the industry of 1,621,000,000 lb., recorded in 1931.

Per capita consumption of candy rose to 16 lb., comparing to a previous high of 15.7 lb., recorded in 1929.

The same report indicates that the candy industry is one of the best customers of other branches of the food industry. In 1936 it used 400,000 tons of sugar, 250,000 tons of glucose, and more than 100,000 tons of nuts, among other ingredients.

Channels of distribution, as determined by the study, show 59.8 per cent of all the candy handled by jobbers, 20.6 per cent sold direct by manufacturers to chain stores, 11.8 per cent sold direct to independent retailers, 7.7 per cent handled through producer-owned outlets and 0.1 per cent through mail order sales.

The complete study is titled "The Candy Industry, An Analysis of Industry Trends with Selected List of References," by Albert S. Nemir. Copies can be procured for 10 cents from the Bureau of Foreign and Domestic Commerce, Washington, D. C.

INDICATORS

FISH LANDINGS in New England in May, 1937, are reported by the Bureau of Fisheries as 35,058,000 lb., 11 per cent lower than for the same month of 1936.

FISHERY PRODUCTS in cold storage in the United States on June 15, 1937, totaled 48,169,000 lb., compared to 46,230,000 lb. on the same date in 1936.

CHEESE IN STORAGE on August 1, 1937, was 128,302,000 lb., compared to 97,403,000 lb. on August 1, 1936, and a 1932-36 average for the date of 95,709,000 lb.

EGGS IN STORAGE on August 1, 1937, were 13,489,000 cases, compared to 10,635,000 cases a year before, and a 1932-36 average of 11,237,000 cases.

POULTRY IN COLD STORAGE on August 1, 1937, totaled 70,125,000 lb., compared to 49,220,000 lb. the year previous and a five-year average of 42,366,000 lb.

MEATS, ALL KINDS, IN STORAGE on August 1, 1937, totaled 580,762,000 lb., while on August 1, 1936, the total was 548,248,000 lb. and the 1932-36 average was 690,566,000 lb.

LARD IN STORAGE on August 1, 1937, was 157,382,000 lb. On the same date of 1936 the total was 117,026,000 lb. and the 1932-36 average for the date was 147,167,000 lb.

CREAMERY BUTTER in cold storage on August 1, 1937, amounted to 124,030,000 lb. The total on the same date in 1936 was 103,259,000 lb., and the 1932-36 average for the date was 124,563,000 lb.

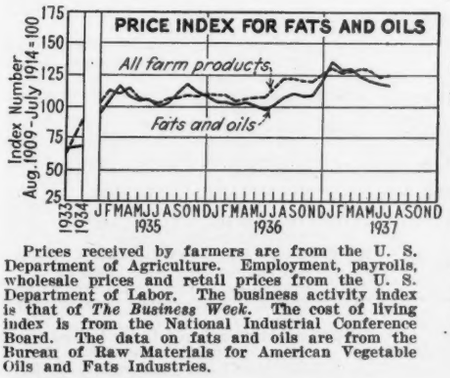
GRAPES AVAILABLE for wine making in California this year are estimated at 700,000 tons, compared to 887,000 tons crushed a year ago.

RAISIN OUTPUT IN 1937 is at present forecast as 250,000 tons.

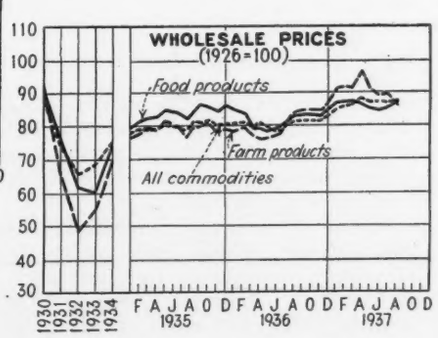
CANNED FOOD PRODUCTION in Texas this year is said to approximate 5,000,000 cases, about double the 1935 output.

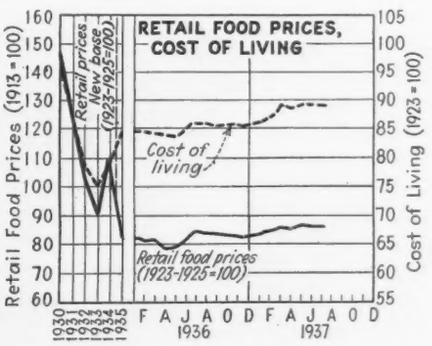
PEAS, CANNED AND FROZEN IN 1937, are now estimated at 296,070 tons, a new record, exceed the former record made in 1935 by about 10 per cent.

CORN CANNING is expected to make a new record this year, as the acreage planted exceeds last year's record acreage by 2 per cent and the weather has been favorable.



Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *The Business Week*. The cost of living index is from the National Industrial Conference Board. The data on fats and oils are from the Bureau of Raw Materials for American Vegetable Oils and Fats Industries.





Keeping Up WITH THE FIELD

Price Law Enacted—Sugar Bill Passes—Standards for Cherries—Food Bill Stymied—New Fumigant Tested—MIT Program Announced

Food Bill Fails Again

AFTER A SPURT OF ACTIVITY early in August, food and drug legislation again hit the doldrums and waited out another session of Congress without being enacted. A subcommittee of the House Interstate and Foreign Commerce Committee prepared a new bill composed of portions of the Copeland bill that passed the Senate this session, the Chapman bill which passed the House last session and several provisions of the Lea Federal Trade Commission bill. It was felt that this measure would gain the support of President Roosevelt, but efforts failed to get it even through the subcommittee. There were too many differences of opinion on the various provisions.

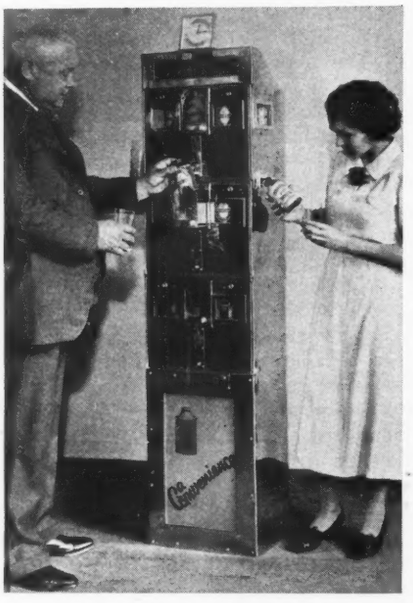
Some observers are predicting action on a food and drug measure shortly after Congress convenes for the next session in January. It is pointed out that the House will be able to take up the legislation without the necessity for long and tedious drafting procedure. But similar predictions have been made at the close of the last two or three sessions, and always the new session saw a repetition of the failure in the previous one.

Sugar Bill Passes

AFTER BEING BOOTED AROUND for months as a political football, the sugar legislation passed the Senate practically by acclamation on Aug. 13, a week after it had been put through the House.

In a move to effect a compromise with the demands of President Roosevelt, the Senate amended the bill to place continental and territorial refiners under quotas, thereby hoping to overcome the argument that the provisions discriminated against Hawaii and Puerto Rico. The tax on blackstrap molasses was eliminated by the Senate and the yardstick for determining sugar prices was based upon the index of all foods rather than on that of the five major crops. The Senate and House both approved the provision placing the tax at approximately 50 cents a hundred pounds on manufactured sugar.

At the time FOOD INDUSTRIES went to press, the bill was being considered by conferees of the two houses, it being anticipated that the Senate amendments would prevail. And indications were that the President would sign the measure rather than permit the quota system established under the Jones-Costigan Act to lapse when that act expires.



NO BARTENDER NEEDED

In England, beer in cans is now being distributed by automatic vending machines. Put in a coin, open a drawer and you have it. A can opener and glasses complete the curb service. No refrigeration is supplied, because the English don't chill their beverages. In America it would have to be different. To meet the opening- and closing-hour requirements of the licensing law, the maker of the machine, Clement Garret, Sheffield, is experimenting with clock control.

Price Bill Becomes Law

REACHING THE WHITE HOUSE as a rider on the District of Columbia tax bill, the Miller-Tydings price-maintenance measure was signed by President Roosevelt on August 18.

Putting into national force a type of law that already had been enacted in 41 states, the measure legalizes price-maintenance contracts between the manufacturers and retailers of trade-marked products, where these move in interstate commerce. Because of the strong position of private brands, there is considerable doubt as to the effectiveness of the law in the food industries. Many manufacturers of national brands will hesitate to set a price on their products, because doing so would enable the private-brand distributors to undersell them.

Recommends Standard Boxes

SIMPLIFIED STANDARDS for the corrugated and solid fiber boxes used for canned fruits and vegetables have been approved by National Bureau of Standards and National Container Association. Revised from the original recommendation, the standards have been submitted to box manufacturers, canners, carriers and others concerned for consideration and approval. The proposed revision includes recommended inside dimensions of boxes, based on arrangement in the box of stock cans, recently adopted as standard by the canning industry and food distributors.

Correction

TO THE LIST OF COMPANIES which supplied equipment and materials for the Borden Riverside plant should be added Robert A. Keasbey Co., which supplied ARMORAK brinepipe covering. This list appeared in the August issue, page 486.

CONVENTIONS

SEPTEMBER

6–10—American Chemical Society, semi-annual meeting, Rochester, N. Y.
14–17—Food Technology Conference, Massachusetts Institute of Technology, Cambridge, Mass.
22–24—National Industrial Advertisers' Association, Inc., Edgewater Beach Hotel, Chicago.
27–28—Super Market Institute, Hotel Astor, New York.

OCTOBER

11–13—International Association of Milk Sanitarians, Brown Hotel, Louisville, Ky.
18–20—International Association of Ice Cream Manufacturers, Dallas, Texas.
21–23—International Association of Milk Dealers, Dallas, Texas.
21–27—Dairy Industries Exposition, Municipal Auditorium, New Orleans.
24–27—American Bakers' Association, Municipal Auditorium, Kansas City, Kan.
26–29—Association of Dairy, Food and Drug Officials of the United States, Raleigh Hotel, Washington, D. C.

PROGRAM OF FOOD TECHNOLOGY CONFERENCE AT MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Tuesday, September 14—9 a.m.

PROFESSOR S. C. PRESCOTT, Dean of Science, Massachusetts Institute of Technology,
"The Purpose of the Conference."

DR. F. C. BLANCK, Chief, Division of Food Research, Bureau of Chemistry and Soils, United States Department of Agriculture,
"The Significance of Technological Progress in Food Research."

DR. L. V. BURTON, Editor, Food Industries,
"The Importance of the Unit Operation Concept in Food Engineering."

PROFESSOR F. W. TANNER, University of Illinois,
"Microbiology and Its Relation to Food Preservation."

DR. J. A. TOBEY, Director of Health Service, Borden Co.,
"Some Recent Advances in Dairy Technology."

M. E. PARKER, Chairman, Research Committee, American Association of Creamery Butter Manufacturers,
"A Technological Exploration of Art of Buttermaking."

Luncheon, North Hall, Walker Memorial—12:30 p.m.

2:00 p.m.
Professor S. C. Prescott, presiding

H. F. JUDKINS, Vice-President, Sealtest System Laboratories, Inc., National Dairy Products, Inc.,
"Problems Yet to be Solved in the Dairy Industry."

DR. L. A. ROGERS, Director, Bureau Dairy Industry, United States Department of Agriculture,
"The Canning of Cheddar Cheese."

DR. F. F. FITZGERALD, Director Research, American Can Co.,
"The Development of the Paper Milk Bottle."

DR. B. H. WEBB, Dairy Manufacturing Specialist, Bureau of Dairy Industry, U. S. Department of Agriculture,
"The Utilization of Whey."

C. A. HOLMQUIST, Chief, Division of Sanitation, New York State Department of Health,
"Pasteurization Engineering for Dairy Products."

DR. A. C. FAY, Director of Research, H. P. Hoods and Sons, Boston,
"Current Technological Problems in the Dairy and Ice Cream Industries."

Wednesday, September 15—9 a.m.
Professor S. C. Prescott, presiding

DR. A. W. BITTING, Food Technologist, San Francisco,
"Trends in Canning Practice."

DR. E. J. CAMERON, Assistant Director, National Canners Association Laboratory, Washington, D. C.,
"Recent Developments in Canning Technology with Reference to Spoilage Control."

DR. C. O. BALL, Research Division, American Can Company, Maywood, Ill.,
"Advancement in Sterilization Methods for Canned Foods."

H. A. BARNBY, Director, Packaging Research Division, Owens-Illinois Glass Co.,
"Food Preservation in Modern Glass Containers."

DR. S. H. AYERS, Director of Research, Crown Can Co., Philadelphia,
"The Canning of Fruit Juices."

11:30 a.m.-2 p.m.

Visit to research laboratories and plant of Dewey & Almy Chemical Co.

2:15 p.m.
Bradley Dewey, presiding

W. A. TAYLOR, Vice-President, American Can Co.,
"The Development of a New Container—the Beer Can."

PROFESSOR G. R. HARRISON, M.I.T.,
"Use of the Spectroscope in Food Research."

WILLIAM H. HARRISON, Director of Research Department, Continental Can Co.,
"The Research Problems of the Can Manufacturer."

M. P. VUCASSOVICH, Food Technologist, Gorton-Pew Fisheries Co., Ltd., Gloucester, Mass.,
"Special Problems in Fish Canning."

PROFESSOR R. S. WILLIAMS, M. I. T.,
"Research in Metallurgy and Its Significance in Canning."

ALLEN ABRAMS, Technical Director, Marathon Paper Co., Rothschild, Wis.,
"Packaging Materials and their Application in the Food Industries."

PROFESSOR MAX LEVINE, Iowa State College, Ames,
"The Applications of Scientific Control in the Bottling Industry."

GEORGE B. SIPPEL, Vice-president, The Burger Brewing Co., Cincinnati,
"Recent Advances in Brewing Technology."

L. F. WARRICK, Sanitary Engineer, Madison, Wis.,
"The Disposal of Food Plant Wastes."

Thursday, September 16—9 a.m.
Gardner Poole, presiding

DR. R. PLANK, Director, Kältetechnisches Institut, Technische Hochschule, Karlsruhe, Germany,
"Some Recent Advances in the Science and Technology of Food Refrigeration."

DR. A. K. BALLS and H. LINEWEAVER, Bureau of Food Research, United States Department of Agriculture,
"Effect of Low Temperatures on Enzymes."

DR. M. PIETTRE, Director, Institut International du Froid, Paris, France,
"Refrigeration Technique,"
"Crystallization and Desiccation of Certain Proteids at Low Temperature."

DR. D. K. TRESSLER, Chief in Research, R. JENKINS, New York State Experiment Station, and G. A. FITZGERALD,
"The Vitamin C Content of Vegetables, and the Effect of Processing for Quick Freezing."

G. A. FITZGERALD, Chief Chemist, Frosted Foods Corp., and PROFESSOR C. R. FELLERS, Massachusetts State College,
"The Vitamin A and C Content of Quick-frozen Fruits and Vegetables."

2 p.m.
Professor S. C. Prescott, presiding

DR. T. MORAN and DR. J. PACE, Low Temperature Research Station, Cambridge, England,
"The Frozen Storage and Gas Storage of Fruits, Vegetables, Fish, and Eggs."

PROFESSOR S. C. PRESCOTT, Dean of Science, M.I.T.,
"Certain Microbiological Aspects of Frozen and Refrigerated Foods."

DR. R. PLANK, Director, Kältetechnisches Institut, Technische Hochschule, Karlsruhe, Germany,
"The Measurement of the Heat to be Abstracted in Cooling and Freezing Foodstuffs."

LOUIS BERUBE, Commissioner of Maritime Fisheries, Quebec,
"Modern Practice in Preservation of Fish by Cold."

PROFESSOR B. E. PROCTOR, M.I.T.,
"Determination of Optimum Conditions for Domestic Refrigeration of Foods."

PROFESSOR A. W. EWELL, Worcester Polytechnic Institute,
"The Utilization of Ozone in Refrigeration."

PROFESSOR JAMES HOLT, M.I.T.,
"Air Conditioning for Food Plants."

6:30 p.m.

Dinner under the joint auspices of the M. I. T. Food Technology Conference and the American Society of Refrigerating Engineers.

Friday, September 17—9 to 11 a.m.

This period will be devoted to round-table discussions.

11:15 a.m.

The members of the Food Technology Conference will leave the Institute promptly by bus for Gloucester, where an old-fashioned New England clambake will be provided by the courtesy of the Gorton-Pew Fisheries Co., Ltd.

NOTE. The above conference is open without charge to all qualified, interested persons. Since the total registration must be limited those desiring to attend should write at once for complete information and for cards of admission to the Department of Biology and Public Health, Massachusetts Institute of Technology, Cambridge, Mass.

Chance to Win $250

To SECURE for the chemical and chemical process industries a slogan encompassing their aims and manifold benefits, a first prize of $250 is to be awarded for the best brief descriptive expression submitted. Eleven prizes in all, totaling $300, have been announced by the management of the Sixteenth Exposition of Chemical Industries, to be held at Grand Central Palace, New York, Dec. 6-11. It is the hope of the Exposition management to secure a slogan which will be a verbal rallying point that will symbolize the accomplishments and coordinate progress of the chemical industries as a whole.

Potent New Fumigant

METHYL BROMIDE has been very successfully applied as a fumigant by California's State Department of Agriculture. And it is said to have contributed more to the serious problems of pest control than any other fumigant ever developed.

Used first as a treatment to destroy tuber moth in California potatoes, it enabled the shipment in the first year of 235 cars which otherwise would not have been permitted to move. It was then used with equal effectiveness to destroy the pinworm in tomatoes. And it can be employed to kill the vegetable weevil in celery, to free Cuban pineapples of mealybug infestation, and to destroy Japanese beetles in green vegetables such as peas, snap beans, tomatoes, eggplant and green corn. Recently, the gas has proven effective in destroying cheese mite in cheese factories.

The new fumigant is now being tested on sweet potato weevil, apple maggot, European corn borer, Indian pod borer and many other pests.

New Cherry Standards

STANDARDS HAVE BEEN REVISED for canned cherries and canned red sour pitted cherries. Promulgated by the Food & Drug Administration, the new standards became effective on July 26. The revised standard of quality and condition for canned cherries reads: "Standard canned cherries are the normally flavored and normally colored canned food consisting of (1) the normal sized, uniform sized, fleshy, mature, unblemished, stemmed, whole fruit of the sweet cherry tree (*Prunus avium*), sugar solution of sufficient strength so that the liquid portion of the finished product reads not less than 16 deg. Brix."

The new standard of quality and condition for canned red sour pitted cherries is as follows: "Standard canned red sour pitted cherries are the normally flavored and normally colored canned food consisting of (1) the mature, unblemished, stemmed, pitted fruit of the red sour cherry tree (*Prunus cerasus*), and (2) sugar solution of sufficient strength so that the liquid portion of the finished product reads not less than 16 deg. Brix.

Canned red sour pitted cherries are of standard fill with respect to packing medium when the drained weight of cherries equals or exceeds the following amounts:

Overall Dimensions Sealed Can		Drained Cherries
Diameter (Inches)	Height (Inches)	Weight (Ounces)
3–7/16	4–9/16	13.5
6–3/16	7	74.0

To allow for shrinkage where considerable sugar is used, a tolerance of 5 per cent below the above weights is allowed in products showing a Brix of 20 deg. or above. Pending the issuance of standard fill requirements for cans of less usual sizes, red sour pitted cherries in cans of a size not mentioned above will be regarded as of standard fill with respect to packing medium when the drained weight of cherries equals or exceeds 1 oz. for each 2.6 cu.in. inside capacity of the container.

Court Upholds Labor Board

LABOR DISPUTES affecting substantially that volume of a manufacturer's output which is to be transported in interstate commerce can be regulated by Congress. Such was the opinion handed down by the Circuit Court of Appeals in the cases of Santa Cruz Fruit Packing Co. and the National Labor Relations Board, the court sustaining the application of the National Labor Relations Act to the business of the fruit company.

An important point in this case was the fact that 61 per cent of the company's business is intrastate, while only 39 per cent is interstate. The court's decision shows that the intermingling of the two activities does not take from Congress the right to regulate that substantial portion over which the Constitution grants control to the Federal government.

The case grew out of a charge that the company had locked out 31 warehousemen for union activities and refused to reinstate them. This occurred in August, 1935, and on April 2, 1936, the NLRB upheld the union's contention that its members had been discriminated against.

Will Dramatize Meat

NO LESS than 100,599 sq. ft. of space has been leased at the New York World's Fair by Swift & Co. In an exhibit dramatizing the story of meat, Swift hopes to create one of the educational highlights of the fair. The company will erect a major exhibit building on its plot, which is in the food-exhibition center.

Introducing UCAPAWA

WHAT THREATENS to be a major labor organization in the food industries has been formed by the combination of 75 unions under the name of United Cannery, Agricultural, Packing and Allied Workers of America. And this organization is affiliated with C.I.O. Heading up the group, which has headquarters in Washington, D. C., is Donald Henderson, recent A F of L organizer in New Jersey and formerly a teacher at Columbia University. Dividing the country into eight districts, UCAPAWA has launched an intensive drive for memberships.

CONCENTRATES

• Chain stores would be prevented from operating in more than one State under a bill being drawn up by Representative Patman . . . The right to sell milk in paper containers in Connecticut on a price parity with bottled milk has been upheld in the Superior Court, in the case of Borden Co. . . . Quick-frozen Blakemore strawberries in bulk have been placed on the New York market, the method by which they are frozen being the development of the faculty of the University of Tennessee working in cooperation with the Tennessee Valley Authority.

• The good demand which Polish hams were enjoying in this country is said to have suffered recently from the inability of certain packers to resist the temptation to take additional profit by lowering the quality of the product . . . As a direct result of the development of a beer can, American beer is now being shipped to all parts of the world, the first time in history that the United States has been an exporter of beer . . . There is a $75,000,000 market in the United States for canned dog meat, and it is expanding rapidly.

• Buyers of dressed poultry for resale in Maine are regulated by a new State law which requires a record of all transactions, identifying marks of the purchased poultry and the name and automobile registration number of the seller, the purpose being to combat poultry thieves . . . Vitamins A and D are preserved in canned foods, and there is only a small decline in the amount of vitamin C, it has been revealed by investigations of the Research Laboratory of the Norwegian Canning Industry . . . At a meeting of the New York section of American Association of Cereal Chemists on Oct. 11, Prof. R. H. Hopkins, School of Malting and Brewing, Department of Industrial Fermentation, University of Birmingham, England, will talk on "Recent Advances in the Chemistry of Starch and its Degradation by the Amyloses."

MEN, JOBS *and* COMPANIES

Industry

» ALABAMA PACKING Co. will construct at Birmingham a vegetable-oil and shortening plant.

» ANGOSTURA-WUPPERMANN CORP., Greenwich, Conn., recently sold to the Pacific Coast Fisheries enough bitters for 15,000,000 cans of salmon. Twenty drops are added to each can.

» ANHEUSER-BUSCH, INC., St. Louis, is spending $4,750,000 during 1937 on a comprehensive building and modernization program. Of this expenditure, about $1,100,000 will go into an eight-story stock-house, and the company is just putting into use new fermenting cellars which cost $750,000. Recently completed is a new plant for the corn products division, devoted to the manufacture of starches and dextrin, which cost $150,000. Aside from these expenditures, about $2,750,000 is being spent on building changes, equipment replacements and modernization throughout the plant.

» ARMOUR & Co., Chicago, recently opened a new branch house in Boston. It is equipped with a sausage kitchen, bacon-slicing room and smokehouses, in addition to the usual beef and pork coolers.

» BORDEN Co. recently took over Evans Milk & Ice Cream Co., Oklahoma City. M. J. Kennedy has been put in charge.

» CADILLAC GINGER ALE Co., Detroit, recently suspended business for an indefinite period because union drivers demanded $35 a week and a commission of 3 cents on every case.

» CARNATION Co. has opened a $250,000 milk-condensing plant at Galax, Va.

» CINCINNATI COCA-COLA BOTTLING Co. is constructing a $600,000 "show plant" at Evanston, a suburb of Cincinnati. Practically every manufacturing and bottling operation will be viewed from a special observation room.

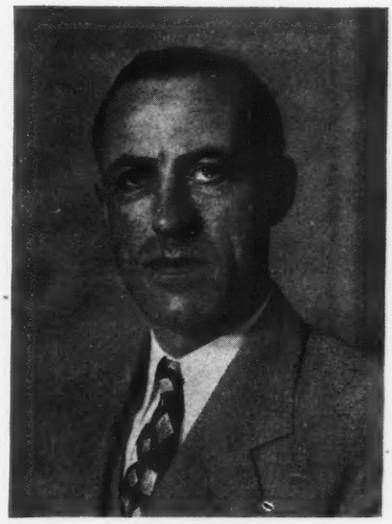
» COMET RICE Co., New York, and Steinhagen Milling Co., Beaumont, Texas, have consolidated to form Comet Rice Mills. The plant at Beaumont has a capacity of more than 250,000 units of packaged rice per day.

» DOLLY MADISON CAKES, LTD., Los Angeles, a division of Western Bakeries Corp., will move into a modern new plant in November.

» GENERAL MILLS, INC., Minneapolis, has purchased the Dakota Elevator, Buffalo. The 1,000,000-bu capacity of this elevator will bring the total grain-storage capacity of General Mills to 8,000,000 bu.

FLETCHER H. RAWLS

Head of the Foodstuffs Division of the Bureau of Foreign and Domestic Commerce, he has been promoted to assistant director of the Bureau. For the present, however, he will continue to direct the work of the Foodstuffs Division. Formerly in the sugar business in Cuba and New York, Mr. Rawls is an authority on sugar.



R. C. FISHER

President of International Association of Milk Dealers and nationally known in the dairy field, he has acquired a controlling interest in Wellesley Farms Dairy, Inc., Weston, Mass., and is serving as president and treasurer of the concern. Mr. Fisher resigned some time ago as vice-president and general manager of R. F. Worden & Sons, Waterbury, Conn.

» GEORGIA PACKING Co. has erected at Thomasville, Ga., a new packing plant which cost $100,000.

» GOLD STANDARD FOOD PRODUCTS has constructed a cheese and butter factory at Fluker, La., this plant taking from $50,000 to $100,000 worth of milk annually.

» HERSHEY (PA.) CHOCOLATE CORP. operating under the name of Hershey Estates, has constructed an abattoir and is building a cannery.

» H. J. HEINZ Co. has transferred its district sales office from Grand Rapids to Holland, Mich. The company operates a plant in the latter city.

» HONOR BRAND FROSTED FOODS CORP., New York, is going into national distribution with 50 quick-frozen products.

» LACHOY FOOD PRODUCTS, INC., Detroit, expects to complete a new factory and office building in October.

» LIBBY, MCNEILL & LIBBY, is spending $100,000 on a new pickle plant and warehouse at Portland, Ore.

» MEMPHIS BUTCHERS' ASSOCIATION opened a new $250,000 abattoir Aug. 2.

» SIOUX HONEY ASSOCIATION is establishing at Sioux City, Iowa, a honey-processing plant with a capacity of 3,000,000 lb. yearly.

» SNIDER PACKING Co. has opened a new pea-canning plant at Houlton, Me.

» SOUTHERN DAIRIES will spend $40,000 to increase the capacity of its Chattanooga plant by 25 per cent.

» TAGGART BISCUIT Co., Indianapolis, has dropped its biscuit and cracker business and will concentrate on its line of small packaged cookies and Hostess cakes. Production facilities for the latter items will be expanded.

» UNITED MILLS Co., INC., dairy and cheese products subsidiary of Loose-Wiles Biscuit Co., has purchased the buildings and equipment of Croghan Creamery Co., Fremont, Ohio. The buildings will be enlarged and remodeled and new equipment installed.

» VIVIANO MACARONI MANUFACTURING Co., St. Louis, has filed bankruptcy schedules, showing liabilities of $44,659 and assets of $88,251. The company has proceedings pending for reorganization.

Personnel

» WILLIAM AMBROSE is now president of Tripoli (Iowa) Canning Co., W. F. Krueger being vice-president.

» GEORGE L. BARNEY recently was named head of Custom House Packing Corp., Monterey, Calif., which packs sardines.

» FRANK C. P. BLODGETT has become president of Frank H. Blodgett, Inc., Janesville, Wis., to succeed his father, Frank H. Blodgett, who retired. The new head of the company served as vice-president for thirteen years.

» W. N. BRYAN has resigned as superintendent of the Northern Packing Co.'s plant at Grand Forks, N. D., which he had managed since 1919.

» J. W. DOTY, General Mills, Inc., was mentioned in the column last month as the new secretary of American Association of Cereal Chemists. However, the new A.A.C.C. secretary is his son, J. M. Doty, of the Omaha Grain Exchange.

» W. R. ENGLAND has been appointed manager of Fresh Milk Institute, which handles more than 95 per cent of the fresh milk in the St. Louis district. He was manager of the Milk Package Exchange for five years, his son now taking over that position.

Hats off to Professor Anderson

(and US too!)

THREE GENERATIONS of Americans, their youthful years brightened by Puffed Rice and Puffed Wheat, "The Food that's shot from Guns", hail Professor Anderson.

And for the benefit of other food manufacturers who have highly specialized roasting, baking, or high temperature cooking problems, we should like to mention with becoming modesty, that the Quaker Oats Company long ago discovered in the famous **Kemp Industrial Carburetor** an efficient and *thrifty* auxiliary to Professor Anderson's famous gun.

Experience indicates that we shall be able to contribute improved temperature control and very material savings to your heating operations. You are cordially invited to ask us how we can be so sure. Address the **C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore, Maryland.**

THE INDUSTRIAL KEMP CARBURETOR

KEMP of BALTIMORE

» HARRY C. FAUERBACH has become general sales manager of the Pioneer Ice Cream Division of Borden Co., New York. Previously he was sales manager of the Horton brand of that division.

» A. B. FORD, formerly plant manager for Mavis Nu-Icy Bottling Co., has been named beverage superintendent of Dossin Food Products Co., Detroit.

» MAX GIBSON has been appointed production manager of Purity Biscuit Co., Salt Lake City.

» EDWARD A. HURLEY, formerly general superintendent of Peter Fox Brewing Co., Chicago, is now assistant general manager of Ekhardt & Becker Brewing Co., Detroit.

» W. M. IRVING has been made assistant to E. L. Crandell, vice-president and manager of Arkansas State Rice Milling Co., Stuttgart. For the past two years he has been manager of Lousiana State Rice Milling Co.

» DR. E. F. KOHMAN, for many years associated with the research laboratories of National Canners' Association, has joined the research staff of Campbell Soup Co., Camden, N. J.

» A. S. LIVINGSTON, former executive with National Chicle Co., American Chicle Co. and Goudey Gum Co., is now president of International Chewing Gum Co., Cambridge, Mass., which he helped to organize. Mr. Livingston has been identified with the confectionery industry for about 25 years.

» HERMANN N. LUTZ has succeeded the late L. L. Maloney as president of Tri-State Packers' Association. He is with J. V. Sharp Canning Co., Williamstown, N. J.

» HUGO MADAUS has been named manager of Farmers' Milling Co., Mt. Clemens, Mich., succeeding Joseph Cody, who resigned. Mr. Madaus was secretary-treasurer of the company for ten years.

» W. W. PADDON has been named manager of the Dayton, Ohio, plant of Loose-Wiles Biscuit Co., succeeding Joe W. Green, resigned.

» CHARLES RITZ, general manager of Robin Hood Mills, Ltd., for the past six years, has resigned to become vice-president of International Milling Co., Minneapolis.

Deaths

» FRANKLIN I. BADGLEY, 50, head of the industrial relations department of Swift & Co., Chicago, July 19.

» DR. LOUIS DAPPLES, 69, president of Nestle's Milk Products, Inc., July 31. A Swiss citizen, he took charge of Nestle's in 1922.

» VAL DECKER, 90, founder and president of Val Decker Packing Co., Piqua, Ohio, July 23.

» HOWARD H. FISKE, 57, operator of a manufacturing and retailing confectionery business at Cambridge and Belmont, Mass., Aug. 10. He formerly was with Kibbe Bros. Co., Springfield, and W. F. Schrafft & Sons Corp., Boston.

» HARRY M. HAMILTON, 49, superintendent of the Swift & Co. plant at Houston, Texas, July 24.

» CHARLES E. HIRES, 85, founder and former chairman of the board of Hires Root Beer Manufacturing Co., Philadelphia, July 31. Mr. Hires was also a pioneer in the manufacture of condensed milk, having built a chain of 21 factories which he sold in 1917 to Nestle's.

» JOSEPH C. HODGSON, 57 managing director of Sea Foods Corp., Halifax, N. S., Aug. 1.

» ANTON C. G. HUPFEL, 68, president of J. Chr. G. Hupfel Brewing Corp., New York, Aug. 1.

» HAROLD MORGAN, vice-president of Standard Nut Margarine Co., Indianapolis, July 18.

» FRANCIS L. SCHREINER, 58, vice-president of Schreiner Grain Co., St. Louis, recently.

» WILLIAM F. SHANNON, 50, manager of Collins Baking Co., Macon, Ga., July 16.

» A. EDWARD WUPPERMANN, 65, president of Angostura Bitters Co., Greenwich, Conn., July 31.

Associated Industries

» AMERICAN ENGINEERING Co., has appointed Sabin Engineering Co., Cleveland as its representative.

» CATERPILLAR TRACTOR Co. has appointed Paul Weeks manager at Washington, D. C. E. B. English has been made manager of Federal and State sales, and H. H. Howard, manager of the engine sales division.

» CHAIN BELT Co. has erected a new building at its works in West Milwaukee.

» DIVERSEY CORP., announces additional service representatives in Boston; Spokane; Kansas City, Mo.; San Francisco; Harrisburg; Atlanta; Columbus; Youngstown, Ohio; Rochester, Minn; Mankato, Minn.; Jacksonville and Omaha.

» FOOTE BROS. GEAR & MACHINE CORP. has appointed Eugene D. Wilson district representative in the Memphis territory.

» JOHNS-MANVILLE INTERNATIONAL CORP., New York, has elected E. S. Crosby president. Johns-Manville Products Corp., announces three new vice-presidents: A. R. Fisher, J. B. Kottcamp and Alexander Cromwell.

» LINCOLN ELECTRIC Co. has opened a new sales engineering office at Dayton, Ohio.

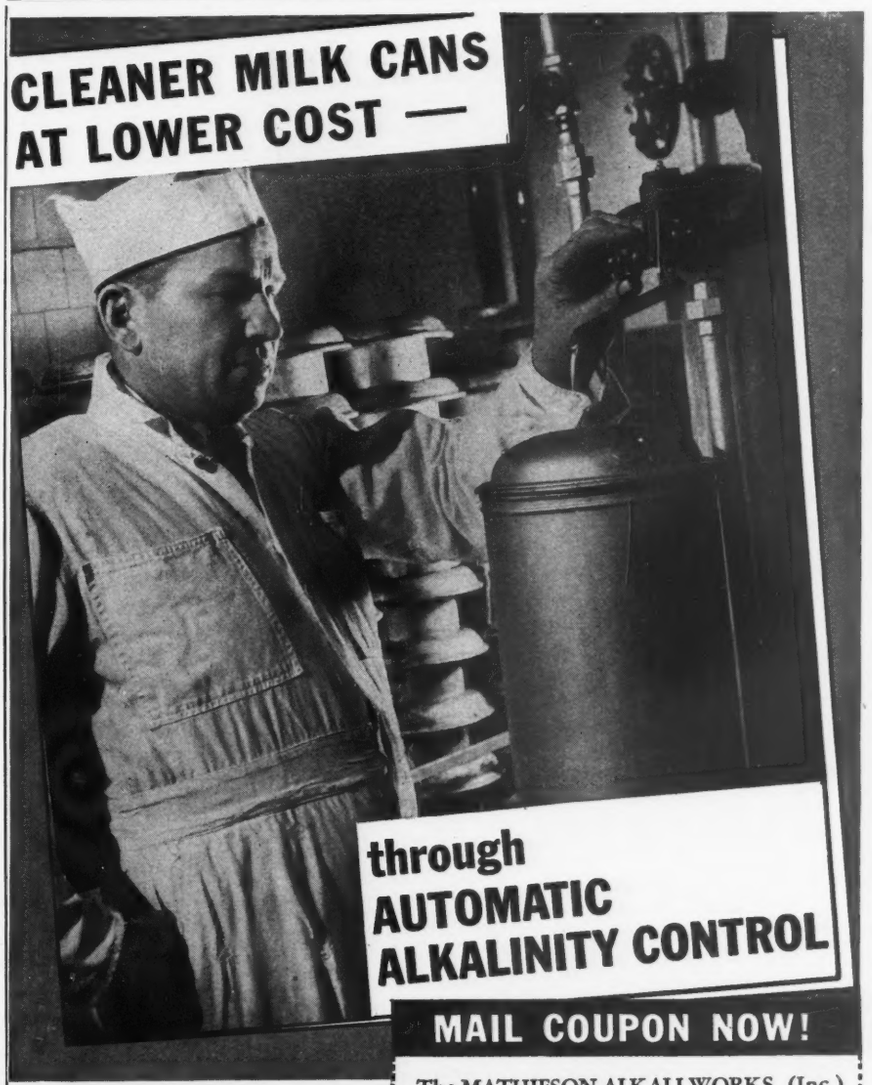
» REPUBLIC STEEL CORP. has appointed Momsen-Dunnigan-Ryan Co., El Paso, Texas, as distributor of Enduro stainless steel.

» ROLLER-SMITH Co. has named H. D. Seaton, Chattanooga, special agent in Tennessee, and Ward Engineering Co., Jacksonville, special agent in Florida.

» STEIN-BRILL CORP., New York, has changed its corporate name to Brill Equipment Corp.

» STOKES & SMITH Co., Philadelphia, has taken over the manufacture and sale of the Transwrap machine.

» WORTHINGTON PUMP & MACHINERY CORP. has appointed W. H. Sherer manager of its Holyoke, Mass., plant.



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Aptitude Affects Food Processing

(*Continued from page* 509)

in Fig. 2, a clamp placed on each end and the measurable force applied, as represented by the two arrows, until the sample breaks. This force, divided by the area of the broken end, was used as the measure of tenderness. The lower this value the more tender the cake.

The effect of altitude or changing air pressures and the amounts of flour and sugar on the tenderness was tested, changing only one ingredient or air pressure value at a time. It was found that an increase in altitude represented by a decrease in air pressure made the cakes more tender, but an increase in flour or a decrease in sugar made them less tender.

With certain formulas, which would be called incorrect formulas, in combination with certain conditions of altitude, cakes fall in baking. As our work progressed it was decided that this was because they were too weak to stand — or too tender. Therefore the first two cakes in Fig. 3 fell because they were too tender. To make them stand up properly it is necessary to change the formula so that the strength of the resulting cake structure will be strong enough to stand. Remember that an increase in flour or a decrease in sugar decreased the tenderness. The thing to do, then, is to take out of the formula just enough sugar or to add enough flour to neutralize the effect of the air pressure of altitudes higher than sea level. Since it is desirable not to make the cakes any more than just strong enough to stand, just the right amount of change in the formula must be made.

These changes were made by applying a little algebra. Finally the following equation was obtained.

$$F—0.43S—0.314A+1.88=0$$

Here F represents the amount of flour and S the amount of sugar in ounces and A the altitude in thousands of feet. If any values between 3 and 6 oz. of flour are substituted for F and values from 0 to 15 substituted for A, the amount of S (sugar) required for F ounces of flour and one pound of egg white to make successful angel food cakes may be calculated.

Cakes 1, 2 and 3 (baked at the altitudes shown) are the results obtained when using the same formula, irrespective of altitude. Cakes 4, 5 and 6 illustrate the results when the formulas are corrected by means of the foregoing equation. It is, of course, not expected that the commercial baker will generally use the equation given, but it is believed that tables which have been prepared[1] will help him to produce better cakes.

There are also other minor changes, which are due to the effects of altitude, such as the browning or caramelization of the crust. Fig. 3 illustrates the condition plainly. This effect is due to the boiling point of the moisture in the crust being lower at high altitudes. Since the boiling point is lower, the temperature of the crust does not reach as high level in cakes baked at 5,000 ft. as in those baked at sea level, consequently, less browning takes place.

Cakes baked at high altitude expand or rise more than those baked at sea level because the air pressure against which they act is less.

The maximum temperature in the center of the cake during baking is always less the higher the altitude, as would be expected, since it has

[1] More detailed information can be found in Colorado Experiment Station Technical Bulletin No. 15.

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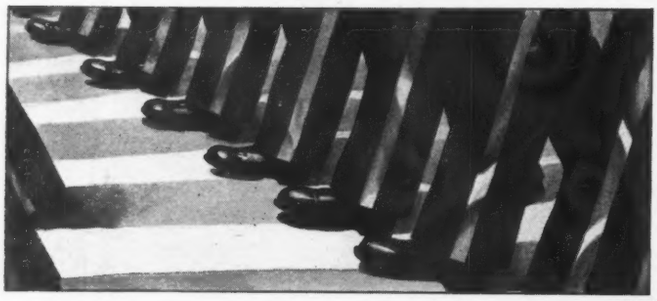

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already been stated that the maximum temperature of any solution is influenced by altitude.

These last two effects of altitude, increased expansion and decreased internal temperature, are the causes of the increased tenderness found in cakes baked at high altitude. Increased expansion seems simply to tear the cake structure sufficiently to weaken it. The decreased temperature seems to cause less chemical change to take place which results in a weaker structure.

Germicidal Paints Retain Protective Powers

(*Continued from 513*)

fections are those resulting from lactic acid rod-like bacteria, (Fig. 1),* followed by those from sarcinae, (Fig. 2), "wild yeasts", (Fig. 3), acetic acid rod-like bacteria, (Fig. 4).

Sanitary laws of most states provide that walls and ceilings of every bakery, confectionery, dairy and similar food manufacturing or processing plant shall be oil painted or kept well lime-washed. Such practice is promoted in the interest of sanitation, not merely for appearances' sake. Published investigations[2, 3, 4] however, have shown that ordinary general-use paints lose their germicidal property after drying for a period of three or four weeks, while halogenated-oil paint has definite, enduring germicidal properties.

Regardless of results obtained in experimental tests, conclusive proof of the germicidal properties of paints tested has to be taken from results obtained when both types of paint are used under industrial conditions.

Since the experimental tests reported in FOOD INDUSTRIES, July, 1937, p. 386, were started, several food plants and hospitals have been using paints containing the halogenated-oil base and showing long-time germicidal properties when tested in laboratory experiments. At this time, these paints have been in use long enough to show their true germicidal properties. Consequently, we have recently made a series of tests on the halogenated-oil paints to find out whether they do or do not retain their germicidal property after a several months, drying and aging period under industrial conditions.

The sanitary value of the halogenated oil paint was studied in comparison with ordinary general-use paints and lime wash. Three different breweries, one oil-containing food processing plant, and a hospital, were selected for these tests.

In the case of the hospital, the results reported to us by the hospital bacteriologist showed that the average number of bacteria taken from the walls covered with ordinary general-use paints were more than 50 times the number taken from walls covered with the halogenated-oil paint. The test was carried out by the hospital bacteriologist in accordance with our test procedure.

We made our own tests on the breweries because of our familiarity with their biological problems and because conditions existing in breweries are in many respects similar to those in other wet processing food plants.

Mold contaminations in the oil-containing food plant gave cause for the tests made there by our method.

In three of the four investigations

* Photomicrographs are reproduced from "Yeast Fermentation and Pure Culture Systems," by Stephen Laufer and Robert Schwarz. Original photographs were taken by S. S. Epstein.

"So What?"

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reported in this article, the bacteriologist in charge of each plant under test assisted in the testing and made independent examinations and records. Agreements within limits of experimental error were obtained.

The table summarizes the results of the practical tests on the sanitary quality of painted or lime-washed surfaces in the three individual breweries. Breweries "A" and "B" are middle-sized breweries, while brewery "C" is one of the largest in the East. The surfaces tested included those of vats and storage tanks as well as walls. The total counts can be considered as a guide in judging the sanitary condition of surfaces and its likelihood of being a potential source of contamination. They also give a general indication of the probable sanitary quality of surfaces not only in breweries but also in other wet processing food plants such as canneries, dairies, meat packing plants and even bakeries.

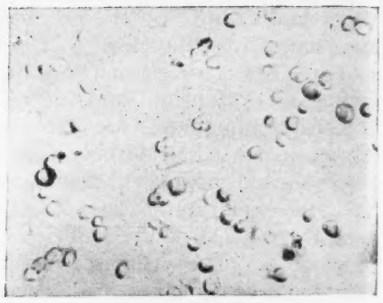

Fig. 5. Pure culture beer shows absence of all contaminating micro-organisms when given the gypsum block test under a microscope.

The cooler room and fermentation cellars are frequently the origin of contamination developing during the fermentation process while the racking cellar and wash house are focal points of infections developing in draft (unpasteurized) beers and ales. It is interesting to compare the counts found on painted surfaces in the cooler rooms of brewery "A" and brewery "B". (See Table) "A" is equipped with an air-filtration and air-conditioning system; yet it gave an average of 2,175 organisms as compared with an average of 110 organisms found on similar surface areas in "B" which is not equipped with an air-filtration and air-conditioning system but which had been painted with the halogenated-oil paint five months prior to the test.

In the wash house of brewery "C", general-use paint was applied to walls from the floor to a height of about 5 feet. Immediately above and on the ceiling the halogenated paint was used. Swabs from 64 sq.in. surface areas of the general-use paint gave an average of 28,450 organisms, while similar swabs from the halogenated paint surface within a foot of the swabbed commercial-use paint gave an average of only 1,825 organisms. The difference represents a reduction of more than 93.5 per cent and can be attributed to the germicidal effect of the halogenated paint. The high count correlates well with the bacteriological air condition of the immediate vicinity of the tested areas. Exposed petri dishes containing brewery wort agar showed an average of 6,780 organisms falling per sq.ft. per hr.

Colonies developing on the wort agar included yeasts, molds and bacteria. Tests in sterile brewery wort and in sterile finished beer showed that microbes encountered on surfaces included rod-like bacteria, sarcinae and "wild yeasts." These microorganisms are responsible for brewery infections in the order given. Torulae, "wild yeasts" and non-brewers' yeasts

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(exclusive of the *Saccharomyces pastorianus-ellipsoideus* group) also prevailed.

Four tests were made on a ceiling of the oil-containing food plant which had had occasional mold contaminations. Two tests were on a general-use paint and two on a halogenated-oil paint. Both paints were put on the ceiling five months prior to the tests. The swabbed areas were within a few feet of each other. Areas of 36 sq.in. of halogenated-oil painted surfaces gave an average of only 10 mold spores, whereas 1,075 mold spores were obtained from the areas covered with general-use paint. This result further indicates the germicidal effect of the halogenated paint.

Use of bacteriological methods to provide means of interpreting the sanitary quality of surfaces is, to the best of our knowledge, new. We give the procedure used by us with the hope that other workers may make similar studies.

Bacteriological examinations of painted surfaces were made by swabbing areas of either 36 or 64 sq.in. Cotton swabs about ¾ in. in length and about 1/8 in. in diameter on wooden Peerless applicators (165 mm. in length), were immersed in 5 cc. saline (0.85 per cent NaCl) in culture tubes (16 x 150 mm.). The tubes were plugged with cotton so that the applicator sticks protruded about 10 mm. above the plugs and then sterilized at 15 lb. pressure for 15 minutes. Swabs were prepared on the day in which tests were made to avoid errors due to evaporation.

The following was the order of procedure carried out in each test:

1. A designated area was ruled off in pencil.
2. The plug was removed by means of the fourth and fifth fingers of the hand, the applicator brought above the surface of the sterile saline, pressed and twisted against the inner wall of the tube so as to displace as much excess liquid from the swab as possible and then removed.
3. The ruled area was thoroughly swabbed, the applicator returned to the tube and the cotton plug inserted.
4. The tube was properly labeled and set in a container (tin can). From four to nine tests were then made and at the completion of such tests, the tubes were taken to the laboratory of the plant in which the test swabs were made. After agitating a tube by striking 25 times against the palm of the hand, 1 cc. of undiluted liquid and of dilutions of 1 to 10 and 1 to 100 were pipetted into petri dishes. Ten cc. of wort agar (2 per cent agar) were then poured into each petri dish, the contents mixed thoroughly and the inoculated medium allowed to harden for plate counts.

To get liquid media cultures the swab from the tube was first immersed in a culture tube of sterile beer, allowed to remain for about 30 seconds, removed in the manner previously described and then immersed in a culture tube of sterile brewery wort.

The plates were incubated at 25 deg. C. for four days; the liquid media at 25 deg. C. for seven days. All tests were made in duplicate. The results of these plant tests substantiate the reported results of laboratory studies[2,3,4] on the germicidal action of halogenated oil paints on pure cultures of bacteria and molds.

Investigations are now in progress to prove that reduced microbial counts on halogenated-oil paints result from the killing effect of the germicidal properties embodied in the paint. At this date, experiments have been completed to show that "wild yeast" spores in approximate contact with the paint film are killed within 2 hours. Mold spores are killed more slowly, about 86 per cent dying after that same period of time. Details are to be published later.

In isolated places of deeply beamed ceilings where excessive steam continually condenses to form thick films of moisture and to set up a water barrier between the paint surface and microorganisms, the halogenated paint, after 4 or 5 months, may have but a slight germicidal effect upon the development of molds and upon the decrease of microbial count. Where such conditions exist, a reduction of humidity coupled with the use of the germicidal paint should effectively lower the possibility of contamination which is otherwise present comparable to the degree shown in present investigation.

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OAKITE

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SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

New Discoveries

(*Continued from p. 529*)

it has high merit quite aside from its value as a source of iodine.

Digest from "Fish Protein in the Diet," by J. Schormüller, *Chemiker-Zeitung* 61, 536, 1937. (Published in Germany.)

DAIRY PRODUCTS

Huslanka—A Milk Beverage

HUSLANKA IS A BEVERAGE made from sheep or cow milk. It has remarkable keeping qualities and in many ways resembles yogurth, which is popular in some parts of Europe and Asia Minor. A sample six months old was analyzed chemically and bacteriologically. It contained 89.65 per cent water, 1.74 per cent fat, 3.45 per cent total protein, 1.86 per cent lactose, 0.55 per cent alcohol, 2.02 per cent lactic acid and small amounts of acetic, formic and carbonic acids. Its flavor and aroma could not be attributed even in part to diacetyl or acetylmethylcarbinol since these could not be detected chemically. Three strains of lactic acid bacilli and one strain of yeast (closely related to *Saccharomyces lactis alpha*) were isolated. The lactic acid organisms were related to *Thermobacterium bulgaricum* and *Thermobacterium jugert.* Streptococci could be discerned under the microscope, but the high acidity or some other factor prevented their isolation. An artificial huslanka, hardly distinguishable from the natural product, was successfully prepared by inoculating sterilized milk with pure cultures of the above organisms and with *Streptococcus lactis.*

Digest from "Chemical and Bacteriological Analysis of Huslanka," by J. Supinska and E. Pijanoski, Roczniki Nauk Rolniczych i Lesnych 38, 223, 1937. (Published in Poland.)

Observations on Oxidized Flavor

OXIDIZED FLAVOR, commonly called papery, cappy, cardboard, tallowy, etc., has been determined to be the most prevalent "off flavor" in milk, and has been found most frequently in milks with high butterfat content, or low bacterial count, according to a study made by Messrs. C. T. Roland, C. M. Sorenson and R. Whitaker, of Sealtest, Inc., at Baltimore.

Oxidized flavor was present in 21 per cent of 139 samples of commercial pasteurized milk taken from dairies in nineteen different cities. Oxidized flavor was present in one or more samples submitted by sixteen of the nineteen dairies. High fat content milks were most frequently affected. Milks of premium grade, which were generally high in fat content and of low bacteria count, were found to have oxidized flavor much more frequently than the standard grades which were generally low in fat content and of higher bacteria count.

Statement released by National Dairy Products Corp.

OILS AND FATS

New Method of Refining Vegetable Oils

A NEW PROCESS for removing mucilaginous impurities, proteins and bitter principles from vegetable oils consists in forming a precipitate with the aid of a borate, phosphate, acetate, tartrate, benzoate or oxalate of sodium and an acid. The effect may be still further improved by adding a small quantity of tin chloride or of an organic material such as gelatin, pyridine or quinoline. As disclosed in Holland Patent 38,952 (granted Sept. 15, 1936 to I. G. Farbenindustrie A. G.), an example of the process is the treatment of peanut oil (1,000 lb.) with 2 lb. phosphoric acid (40 per cent strength) containing 1.2 oz. stannous chloride. After stirring 30 minutes at

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room temperature this mixture is heated to 158 deg. F. and a solution of 2 lb. sodium phosphate (Na_2HPO_4) is added. When this is thoroughly mixed in the oil the emulsion is allowed to stand until the added substances settle to the bottom, carrying the impurities with them as a sediment. From the latter the refined oil is easily separated by centrifuging. Bleaching earth or charcoal may be used in this treatment if desired to reinforce the action of the precipitating agents.

Importance of Washing in Olive Oil Crushing

BECAUSE THE CONVENTIONAL TYPES of crushing mills for making olive oil are cumbersome, expensive and not highly efficient mechanically, there is a trend toward the modern, improved, continuous crusher based on a design originally worked out at the Huilerie de Mollans in Drome. A mild fermentation generally precedes crushing to soften the olives, lower the water content, improve crushing behavior and offset differences in ripeness. But this fermentation must be kept under strict control because the quality of the oil quickly suffers if the bacterial action proceeds too far. Washing the olives before crushing is an expedient which is too often omitted. It improves the quality of the oil at little cost, but even this simple operation needs attention because crushing must follow immediately after washing if excessive fermentation is to be avoided. The new crushers, to which these general statements apply as well as to the older style batch crushers, produce high grade oil because they lessen the time and severity of exposure of pulp and oil to the hazards of spoilage by oxidation or by microórganisms.

Digest from "Crushing Olives in Modern Oil Mills," by A. Rolet, *Matieres Grasses,* 29, 2 and 31. 1937. (Published in France)

How to Avoid Spoilage of Fats

IN GENERAL the spoilage of fats is due either to hydrolytic or oxidative changes. The former are caused mainly by fermentation (bacteria) while oxidation results from exposure to the air. *The best preventive of bacterial spoilage is scrupulous cleanliness in production and processing,* aided by cold storage to retard bacterial growth, and by use of antiseptics under proper circumstances.

Butter, margarine, fatty meats and numerous other fatty food products are readily susceptible to bacterial spoilage and must be guarded carefully. Oxidation by the oxygen of the air is favored by warm rooms, exposure to light, certain degrees of acidity, and the possible presence of oxidation accelerators. Among these last are extremely small traces of iron, copper, cobalt, manganese or lead so that contamination even with the smallest amount of these metals is to be avoided.

To prevent oxidative spoilage the opposite influences are to be sought, which explains the merit of cold storage in the dark for butter and other fats. Storage in an atmosphere which contains no oxidizing gas is also effective; the atmosphere of the storage chamber in this case may be carbon dioxide or nitrogen, neither of which is expensive.

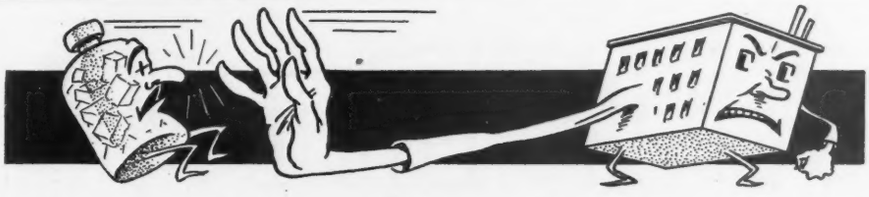
Ozone, although effective against bacterial spoilage, is particularly to be avoided as an ingredient of gases for storage, because it is such an active oxidizing agent. Sardines in oil offer a good example of a product for which the inert gas method can be effectively used.

Digest from "Chemistry of Fats in the Campaign Against Food Spoilage," by K. Taüfel. *Fette und Seifen* 44, 179, 1937.

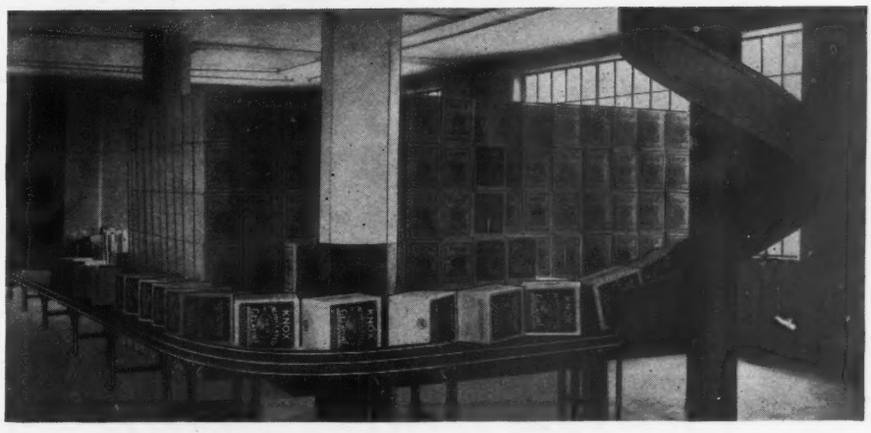
SUGAR AND STARCH

Sugar from Starch

SUGAR which is useful in making jams



Banish the "Bottle Necks" that Choke Production . . .



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Your production system is no faster than its slowest spot. In nearly every plant there is a "bottle neck." Banish it!

Hundreds of plants have found a *fast way through* these traffic jams or "bottle necks" by the *better routing* of materials with Lamson Conveyors. Sometimes a revamping of present conveyors does it.

Lamson engineers have showed hundreds of food plants how to banish "bottle necks." Lamson Conveyors clear away troublesome spots with smooth, straight-line routings. This equipment is backed by 50 years of conveying experience—the kind that builds efficiency and economy. Yes, Lamson offers the world's most complete line of conveying equipment.

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or chocolate products, and can also be employed to good advantage for accelerating dough fermentation, is made by controlled acid saccharification of potato starch or cereal starches. Procedures for the saccharification are described in French Patents 803,298 and 805,695 (granted Sept. 26 and Nov. 26, 1936, to Patent Co. Ltd.). By stopping the acid treatment at the dextrine stage, adding 2—3 per cent of a malt extract and heating at 122—140 deg. F. for about six hours, the starch is largely converted to maltose. The resulting solution, after filtration, can be used in brewing, or as a yeast nutrient. By vacuum evaporation it yields a sugar which can be used in jams and confections. The original solution, without evaporation, can be added to dough to hasten the fermentation process.

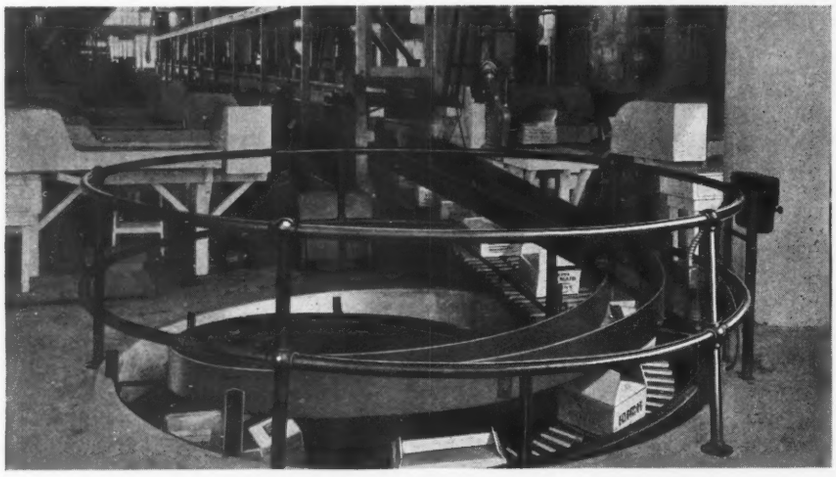
"Glass" From Potatoes

A FOUR-YEAR PROGRAM of research to broaden the industrial outlets for potato starch, as against its uses in food products, has culminated in the development of a substitute for glass. The new material has all the transparency of glass, and indeed more, because it is transparent to the short wave lengths of light which carry the health-giving properties of sunlight. The potato starch product is called "Anras glass." It can be colored if desired. Of course the tests which have been applied cannot fully take the place of prolonged exposure in actual use, since the product is too new, but stability to all wave lengths of light is good according to the exposure tests which have been made.

Toughness is a great advantage because it gives the new glass material a very low breakage hazard. Transmitting the curative, short wave lengths of light is not a property which "Anras glass" can claim as solely its own, because it has been achieved in various special glasses long since. But a material which possesses this valuable property and can still compete with window glass in price is a novelty. In the starch market the discovery is expected to provide a needed balance against other uses, a matter which interests potato producers and starch makers.

Digest from "Glass From Potato Starch," by R. A. van Linge and J. van der Sleesen, *Chemisch Weekblad* 34, 221, 1937. (Published in Holland)

APPLY THE LAW



of Continuous Flow

CONTINUOUS flow in production has the force of natural law. Every production process, every type of machine used in production has a natural course of evolution toward the principle of continuous flow.

Batch and intermittent methods are doomed. In the packaged food industries this has long been apparent. But even in many plants using modern machines and processes, individual operations are not fully integrated and unified so that the plant can operate at its highest over-all efficiency.

Mathews engineers, trained for over 32 years to think of production as one continuous process, often bring about astonishing lowering of cost and increase of output by applying this principle where it has been overlooked, and by relatively small additions to present equipment.

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RAW PRODUCE

Protecting Rail Shipments Of Apples and Pears

FOURTEEN YEARS OF STUDY of the protection of apples and pears from freezing as well as overheating while in refrigerator cars is summarized in this 54-page bulletin. *Overheating the fruit* as a result of attempting to prevent freezing is a problem that has not been widely recognized because its effects are not so quickly apparent as freezing damage. Improvements in handling heater equipment are fully discussed.

An interesting byproduct of this investigation was the fact that wet sawdust on the floor was found to prevent freezing of fruit for limited periods in that dangerous location. A ton of water in the sawdust will release a theoretical amount of heat equivalent to about 22 lb. of charcoal. This is the amount normally burned in a car heater in 25-36 hours. Six inches of wet sawdust gave no more protection than 3 in. presumably because the latent heat of freezing could not escape through the thicker layer. As usual, the railroads objected to such a practice.

Inside control (thermostatic) of the operation of the heaters is recommended as the best way to control temperatures. No cost data are given.

Digest from "Protection of Apples and Pears in Transit from the Pacific Northwest During the Winter Months," by Mallison, Gorman and Hukill. *Technical Bulletin, No.* 550, *U. S. Dept. of Agriculture.*

MISCELLANEOUS

Grape Honey

A HONEY SUBSTITUTE which is popular in Italy is made from grape juice and is called "grape honey." Physically, and even chemically, it has considerable similarity to bee honey. It contains water, total sugar, reducing sugars, ash and protein within or very close to the range of proportions generally accepted for these components in bee honey:

	"Grape Honey" Per cent	*Bee Honey* Per cent
Water	24	18–25
Ash	0.90	0.1–0.8
Total sugar	72	70–80
Reducing sugars	66.8	60–70
Total protein	0.787	0.8–0.9

A notable difference is that "grape honey" is relatively rich in phosphorus (0.608 per cent calculated as phosphorus pentoxide) and also contains more calcium (0.16 per cent calculated as the oxide) than does bee honey. Analysis of the ash also reveals iron, copper and manganese. Thus the product is useful from the dietetic standpoint, introducing into the body several needed elements in assimilable form. Nearly all the phosphorus, for instance, is present in the form of lecithins.

Another notable feature is that half of the total content of reducing sugars is levulose (fruit sugar). The substance is opaque, with about the color and consistency of cold bee honey. Its flavor, peculiarly its own, clearly discloses its origin (grapes), the predominant taste sensation being of salinity and of acidity. The energy content, about 3 calories per gram, is approximately the same as that of bee honey.

Digest from "Chemical Composition and Food Value of "Grape Honey," by E. Caserio, *l'Industria Italiana delle Conserve Alimentari*, 11, 51, 1936. (Published in Italy)

Better Way to Score Egg Quality

THERE ARE FOUR WAYS to determine the quality of eggs: (1) by observation, (2) the yolk index (maximum height of yolk ÷ mean diameter of yolk), (3) percentage of firm white (height of the apparent thick white ÷ mean width), (4) albumen index (computed from egg weight and albumen height). The albumen index is more closely related to observed interior quality, whereas the second and third methods bear little, if any, relation to the observed grade.

Digest from "The Relationship between Yolk Index, Percentage of Firm White, and Albumen Index" by Heiman and Wilhelm. *Journal of Agricultural Research*, 54,551, 1937.

Starch for Puddings

TO MAKE A SMOOTH, ODORLESS, TASTELESS STARCH BASE for puddings from a plentiful, inexpensive source of starch, a very thin paste or milk of potato starch is hydrolyzed under mild conditions until it acquires the properties required for a pudding base. The acid needed for hydrolysis may be sulphuric acid, which is cheap and effective. Sulphur dioxide, either as such or in chemical combination as a bisulphite, should also be present during the hydrolysis. Heating must not be excessive because the paste-forming temperature must not be reached while the acid is present.

The hydrolysis is stopped when a test sample, after washing out the free acid and boiling water, cools to a smooth paste having the desired consistency for a pudding base. As the invention is disclosed in German Patent 642, 375 (granted March 2, 1937, to Wirtschaftliche Vereinigung Deutscher Starkeindustrien i. L., Berlin, Germany), a suitable procedure is to acidify 100 liters (about 105.5 quarts) of a potato-starch milk, specific gravity 1.19, with 1 kilo (about 2.2 lb.) of concentrated sulphuric acid, add 0.5 kilo (about 1.1 lb.) sodium bisulphite, and heat at about 50-55 deg. C. (112-130 deg. F.). Under these conditions the desired consistency is attained by heating about four hours.

LIQUID HCN *Kills all insects*

that infest stored food products

AT A COST OF A FEW CENTS

If you store or handle large quantities of cocoa beans, chocolate, dried fruit, nuts, cereals, cereal products, candy, or confectionery in any form, you know how easily they can become infested with insects. You know too how quickly these insects spread and contaminate the entire factory, and how ordinary methods of pest control are comparatively expensive and inadequate.

LIQUID HCN—the all-purpose pest destroyer—is a powerful and concentrated fumigant which kills these unsavory pests (as well as rats and mice) at a very low cost—a split-fraction investment compared to the savings resulting from the thorough control LIQUID HCN always gives. Many leading importers and manufacturers have standardized on this form of fumigation as not only the cleanest and most efficient, but the lowest in cost.

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LEAVES NO RESIDUE TO AFFECT ODOR, TASTE, OR COLOR

BOOKS RECEIVED

APPERTIZING OR THE ART OF CANNING; ITS HISTORY AND DEVELOPMENT. By A. W. Bitting, M.D. Published by Trade Pressroom, San Francisco, Calif., 1937. 857 pp.; 7x10 in.; cloth. Price, $7.

Written by a well known technologist in the canning industry, this book outlines in detail the development of methods followed in commercial canning and describes the preferred technic of today. The first part of the book includes papers and patents of historical importance in the development of the canning industry. But the bulk of the material is devoted to the various products put up in cans and the processes employed. Under peaches, for example, is given information on the origin of the peach, its horticultural character, the extent of the peach canning industry, field production, contracts, canning, splitting and pitting, lye peeling, grading for size, exhausting, cooking, sliced peaches, special packing, pie fruit, crushed and cut fruit, cans used, syrup, troubles encountered, standards, label weights and so forth. Intended for operators and superintendents of plants, the book has much practical value, yet it is written in non-technical language.

FACING THE TAX PROBLEM. Prepared under the auspices of the Committee on Taxation of Twentieth Century Fund, Inc. Published by Twentieth Century Fund, Inc., 330 West 42nd St., New York, N. Y., 1937. 606 pp.; 6¼x9¼ in.; cloth. Price, $3.

Prepared to give the reader an understanding of the tax system in the United States—including federal, state and local taxes—this book will provide executives with a background of information that will be helpful in future tax battles. Two chapters are devoted to conclusions on the tax problem and to recommendations for changes in the present system.

ACCIDENT FACTS, 1937 Edition. Published by National Safety Council, Inc., 20 North Wacker Drive, Chicago, Ill. 96 pp.; 6x9 in.; paper. Price, 50 cents. A comprehensive compilation of statistics on all types of accidents, including occupational.

ADVERTISING AND SELLING FOOD TO QUANTITY COOKERY KITCHENS. By J. O. Dahl. Published by Hospitality Guild, Haviland Rd., Stamford, Conn., 1937. 48 pp.; 3⅞x6⅛ in.; paper. Price, 50 cents. Statistics and other information of value to food distributors selling restaurants, hotels, railroads and other larger buyers.

ANALYSIS OF ICE CREAM SALES. Published by International Association of Ice Cream Manufacturers, 1105 Barr Bldg., Washington, D.C., 1937. 12 pp.; 9x6 in.; paper. Price, $1, except to Association members. Bulk, package and novelty sales are covered, the statistics being based on a production and distribution survey.

NUTRITIVE ASPECTS OF CANNED FOODS. Published by American Can Co., 230 Park Ave., New York, N. Y., 1937. 110 pp.; 6¼x9¼ in.; cloth. A bibliography of scientific reports and helpful tables of food data.

PATENTS

Chocolate Confectionery Made Into a Puffed, Cellular or Honeycomb Form—John William Todd, East London, Union of South Africa. Nos. 2,082,312 and 2,082,313. June 1, 1937.

Sugar Juices Decolorized Through Simultaneous Action of Hydrogen Peroxide and an Agent Such as Activated Charcoal, Bone Charcoal, or Silica Jell at a Temperature Ranging From 60 to 90 Deg. C.—Emil Scheller, Lorsbach in Taunus, Germany, to Deutsche Gold und Silber Scheideanstalt Vormals Roessler, Frankfort-on-the-Main, Germany. No. 2,082,425. June 1, 1937.

Fruit and Vegetable Juices Stabilized by Hydrolyzing All Proteolytic, Mucilaginous and Gummy Material With 1-Per cent Solution of Sodium Chloride and Subsequently Removing the Hydrolyzed Materials by the Addition of Pineapple or Papaya Juice Without Added Acids or Application of Heat—Edwin Schoop, Rheinfelden near Basel, Switzerland. No. 2,082,426. June 1, 1937.

Fruit in Closed Containers Sterilized by Retorting in Such a Way That the Sterilizing Liquid Can be Retained and Used for Subsequent Retorting—Kaare Omsted, Oslo, Norway. No. 2,082,460.

Fish Meal Particles Coated With Previously Dried Material Before Drying in Current of Hot Gases—Alfred R. Smith, Forest Hills, N. Y., to Combustion Engineering Company, Inc., New York, N. Y. No. 2,082,555. June 1, 1937.

Fruit Freed From Spray Residue by Washing in Solution Containing an Alkali-Metal Hexametaphosphate—Ralph E. Hall, Mt. Lebanon, Pa., to Hall Laboratories, Inc., Pittsburgh, Pa. No. 2,082,573. June 1, 1937.

Cane Sugar Liquor Decolorized by Treatment With Alkali at a Temperature Below Boiling Point of Liquor, With Hydrogen Peroxide, With Catalyst to Decompose Excess Hydrogen Peroxide, and Filtration Through Adsorpant Filters—Joseph S. Reichert and Ralph B. Elliott, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del. No. 2,082,656. June 1, 1937.

Candy Wrapped in a Transparent Sheet Decorated to Give the Confection a Doll-Like Appearance—Edith M. Walker, San Francisco, Calif. No. 2,082,671. June 1, 1937.

Mushrooms Sliced by Mechanical Means—Wm. E. Chambers, Westchester, Pa. No. 2,082,872. June 8, 1937.

Bread Baked in Sandwich Loaf Form Without Burning of Top Crust By Use of Baking Pan With a Cover Having a Perforated Liner—Albert Prabell, Bellevue, Ky., to Lockwood Manufacturing Co., Cincinnati, Ohio. No. 2,082,973. June 8, 1937.

Fruit Ices Made by Atomizing Mixture With Gas Refrigerant Into Vented Compartment—Ernest Edison Lindsey, San Francisco, Cal. No. 2,083,072. June 8, 1937.

Peas Heated to 100 Deg. C., With Molasses and Jelly Pieces With or Without Addition of Fruits and Cakes Canned to Serve as a Balanced Diet Ration After Exhaustion of Air, By Tight Sealing and Subjecting to Heat Sterilization at Relatively Low Temperature of 7 to 80 Deg. C. With Rapid Cooling—Kintaro Kimura, Tokyo-Shi, Japan. No. 2,083,302. June 8, 1937.

Raw Cheese Processed to Pasty Consistency by Drawing Mass Into Continuous Ribbon-Like Layer of Uniform Thickness and Successively Moving the Layer Along on an Externally Heated Surface—Bruno Duttweiler, Vevey, Switzerland, to Raw Products, Ltd., London, England. No. 2,083,322. June 8, 1937.

Yeast Grown and Removed From Growing Solution in a Continuous Manner—Heinrich Scholler, Solln near Munich, and Rudolph Eickemeyer, Tornesch, Holstein, Germany. No. 2,083,347. June 8, 1937.

Yeast Grown to Have High Enzymatic Content—Ivan Auguste Effront, Seclin, France, to Standard Brands, Inc., New York, N. Y. No. 2,083,598. June 15, 1937.

Low-Fat Edible Flesh and Internal Organs of Sea Animals Preserved by Dehydrating Raw Material With Heated Train Oil Under Reduced Pressure and at Temperatures Not Exceeding 90 Deg. C.—Johan Olsen, Nygaard, Oslo, Norway. No. 2,083,738. June 15, 1937.

Meat Branded by Strip of Regenerated Cellulose Bearing Identifying Marks—Beverly E. Williams, to Industrial Patents Corp., Chicago, Ill. No. 2,083,765. June 15, 1937.

Soy Beans Given Nut-Like Character by Treating With Limited Amount of Water to Expand Cellular Structure, Submerging in Oil at Temperature of About 375 Deg. F., and Then Decreasing Temperature of Heat Treatment in Oil to Approximately 275 Deg. F.—Alfred H. McComb, Homewood, Ill. No. 2,083,853. June 15, 1937.

Citrus Fruit Given Pine Oil Treatment During Cleansing Operation to Avoid Deterioration—Robert E. Nedvidek, Pomona, and John R. MacRill, Norwalk, Calif., to California Fruit Growers Exchange, Los Angeles, Calif. No. 2,084,062. June 15, 1937.

Pretzels Twisted by Mechanical Means—Harry A. Elliott, Jefferson, Iowa. No. 2,084,193. June 15, 1937.

Sugar Beet Juices Freed From Air and Other Gases by Application of Pressure and One Heating or Cooling During Filtering—Dirk Hendrik Johan van Maanen Berchem, Antwerp, Belgium. No. 2,084,229. June 15, 1937.

Starch Removed From Ground-Up Potatoes and Similar Material Masses by Centrifuging Out of Contact With Air to Form a Milk From Which the Starch May be Recovered—Albrecht Fritze, Arnswalde, Germany. No. 2,084,250. June 15, 1937.

Jellies and the Like Sliced by Mechanical Device—Adolph J. Fink, to National Pectin Products Co., Chicago, Ill. No. 2,084,570. June 22, 1937.

Custard Fillings Prepared to Permit Homogenization at Less Than 100 Deg. F., After Addition of Egg Meats—Iphus Harvey Hall, Winnipeg, Man., Canada. No. 2,084,640. June 22, 1937.

Chickens Roasted for Canning by Subjecting to Atmosphere of Inert Gas and Passing Through Oxygen-Free Heated Oil—William Ross Chamberlin, Ashby, Ightham, England. No. 2,084,721. June 22, 1937.

Yeast Grown on Batch Basis by Periodic Addition of Yeast Nutrients to Keep Constant the Concentration of Yeast Per Unit Volume of Nutrient Wort—Sebastian Lutz and Robert Roy Irvin, Bloomfield, N. J., to National Grain Yeast Corp., Bellevue, N. J. No. 2,084,736. June 22, 1937.

Hams Boned and Pressed Into Uniform Cross-Sectional Form for Placing in Container Preliminary to Cooking—Will W. Hubenet, Detroit, Mich. No. 2,084,806. June 22, 1937.

Automatic Control of PRESSURE

A means of removing a variable in food processing to obtain high quality consistently, to reduce spoilage, to speed production and to cut costs

A UNIT OPERATION OF FOOD ENGINEERING

Pressure Control

▶Automatic control of pressure has come to mean more in food-plant operations than mere regulation within limits that insure safety. It is now the means of removing a process variable so as to permit production of a product that meets the manufacturer's standards of quality. And it is a tool by which processors can make their operations more automatic and more rapid, while at the same time eliminating costly spoilage and effecting savings in fuel and other operating costs. Pressure control, in fact, has taken its place alongside temperature control as an indispensable instrument in modern food-plant engineering.

This is No. 11 in a series on the unit operations of food engineering.

PRESSURE CONTROLLERS, which found their first application in the power-generating field as safety devices, are extensively employed for regulating and reducing steam pressures between the boiler and the processing equipment in industrial plants. But they also are widely used in the process itself to remove variables which would upset the process. And they have been adopted as essential equipment in many of the food industries, including canning, meat packing, baking, dairy, confectionery, carbonated beverage, brewing, sugar, salt, coffee and dehydrating plants.

For the food-plant engineer who needs pressure controls in the factory, a wide variety of instruments is available. But they may be classified into three groups. The simplest and least expensive type of control is the self-operating. Then there is the self-operating with auxiliary pilot valve to give more accurate control. Finally, there is the power-operated group, including those instruments which employ electricity, compressed air and hydraulic pressure to actuate the pressure-regulating valve.

The simplest of the self-operating pressure regulators, or controllers, is the pressure-relief valve. One of these is shown in Fig. 1, this particular valve having been developed by McAlear Manufacturing Co. to safeguard water heaters, plumbing fixtures, tanks and similar equipment against damage from excessive pressure. Held closed by an adjustable spring, the relief valve plug opens when the pressure exceeds that for which the spring is set. Steam-pressure relief valves are the most common of all pressure regulators, these being used even on such a simple piece of equipment as a laboratory retort.

Next simplest is the pressure-reducing valve of the self-operating type, this being extensively employed to reduce the pressure of steam from that at which it is generated in the boiler to that required in processing equipment. In this type of regulator the reduced pressure (that on the downstream side of the valve) acts upon a diaphragm or piston opposed by a spring or weight to close the valve when the pressure exceeds that for which the valve is set to operate. In these reducing valves, the diaphragm or piston may be within the valve body itself, as is the case in the controller illustrated in Fig. 2.

The regulator shown in Fig. 2 incorporates a valve of new design. Developed by A. W. Cash Co., the valve element is streamlined to reduce turbulence in the fluid as it passes through the regulator. But the principle of operation is the same as in other self-operating regulators. If the pressure on the downstream side of the valve plug falls below the control point, the spring pushes the diaphragm down and opens the valve. Then as the pressure on the downstream side of the valve, and hence in the valve body, builds up, it pushes the diaphragm up by compressing the spring. This action closes the valve and prevents further increase in the pressure, or reduces it when it becomes excessive. The action of this valve, of course, is throttling, the valve element ordinarily being neither completely closed nor completely open. This valve is adjusted for different pressures by turning the screw in the top of the valve body to change the pressure exerted by the spring on the diaphragm.

A diaphragm-actuated pressure regulator of different construction is shown in Fig. 3. Here the diaphragm is in a separate chamber which is connected to the valve body by passages through which the controlled pressure acts against the diaphragm. A weight, not a spring, opposes movement of the diaphragm in this unit, and the position of the weight on the lever determines the magnitude of the reduced pressure maintained. This regulator is provided with a needle valve which may be adjusted manually to vary the size of the port through which the pressure reaches the diaphragm chamber. Throttling the needle valve prevents pulsations in the pressure acting against the diaphragm and gives close, sensitive control.

The valve shown in Fig. 3 has a large diaphragm because it is intended for the regulation of gas or air pressures, not for controlling the pressure of liquids. Built by McAlear Manufacturing Co., it is suitable for inlet pressures of up to 250 lb. and reduced pressures ranging from atmospheric to 25 lb.

As quite commonly used in food-process pressure control, the self-operating pressure regulators of the diaphragm types have a diaphragm chamber which is entirely separate from the valve body and which is connected through a tube to the point at which pressure is being controlled. The valve illustrated in Fig. 4 is typical of this kind of regulator, a type made by sev-

eral manufacturers. It is used for controlling the pressure in canning retorts, and is the product of the American Schaeffer & Budenberg Division of Consolidated Ashcroft Hancock Co. As installed, the valve body is in the steam line to the retort, and the pressure-feeler tube attached to the diaphragm chamber is connected to the retort. The diaphragm in this controller is large to assure high sensitivity. And advantage is taken of this high sensitivity to set the valve so that it does not begin to close until the retort pressure has been raised above the point at which it is to be held. This permits the pressure, and hence the temperature, in the retort to be raised more quickly than would be possible if the valve started to close and restrict the flow of steam as soon as the pressure began to build up. This, of course, saves time in processing a

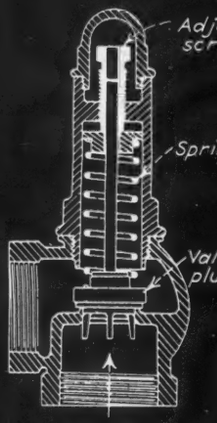


Fig. 1 — Pressure-relief valve

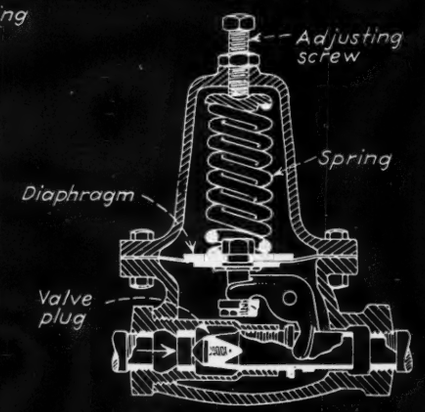


Fig. 2 — Self-acting pressure reducer of diaphragm type

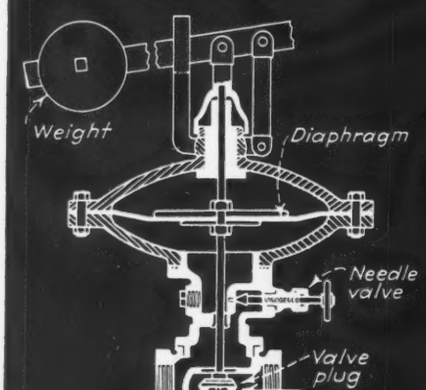


Fig. 3 — Self-acting regulator with needle-valve adjustment

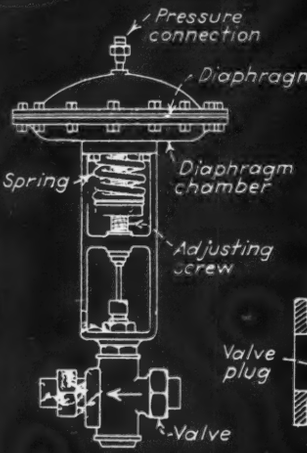


Fig. 4 — Pressure regulator designed for canning retorts

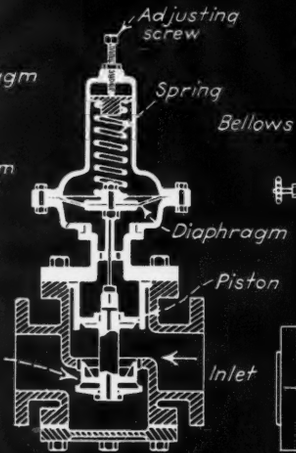


Fig. 5 — Piston-balanced, diaphragm-actuated regulator

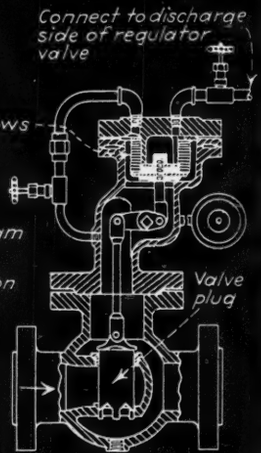


Fig. 6 — Bellows-actuated regulator with high-lift valve

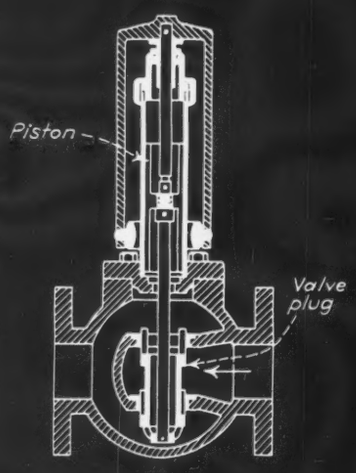


Fig. 7 — Pressure regulator of piston type

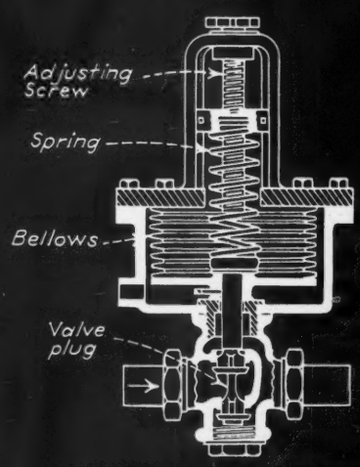


Fig. 8 — Vacuum controller of self-acting, bellows type

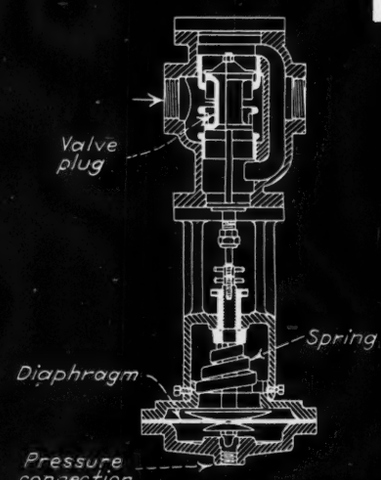


Fig. 9 — Regulator for controlling speed of vacuum pump

batch and gives higher production per day per retort in the cannery.

Somewhat different in construction from the regulators mentioned above is the one in Fig. 5. This is diaphragm-actuated, but it is piston balanced to stabilize its operation and provide better regulation. In operation the force of the inlet pressure is applied equally to the underside of the piston and the top of the valve plug, the one force cancelling the other since the two act in opposite directions. This leaves the valve free to move as the diaphragm responds to pressure changes. The reduced pressure is admitted to the lower side of the diaphragm chamber through a passage in the valve plug, and it actuates the diaphragm against spring pressure. A product of McAlear Manufacturing Co., the regulator shown in Fig. 5 is designed primarily for controlling water pressure to prevent damage to the plumbing in an industrial plant.

A diaphragm is not always used as the actuating element in self-operating regulators. A metal bellows connected to the valve stem is also employed, a regulator of that type being represented in Fig. 6. Here the bellows is connected to the valve stem through a lever whose fulcrum is so positioned as to provide a high valve lift for small movements of the bellows. With this arrangement, it is permissible to use a valve element with long, narrow ports, a construction that gives close regulation of the flow of fluid through the valve, and consequently of the pressure. The valve illustrated, the development of Northern Equipment Co., and known as a Copes valve, uses a weighted lever to oppose the action of the bellows.

Pistons, too, are used to actuate pressure regulators. In fact, what is said to be the first automatic pressure regulator made in America is of that type. Fig. 7 shows one design of piston-actuated regulator. In it the reduced pressure acts upon a piston which is opposed by a weighted lever that does not show in the view illustrated. To steady the control action and eliminate over control with resultant "hunting," for the control point, an oil dashpot is attached to the counterweight liner. This is a unit of Davis Regulator Co.

Vacuum regulators are of the same construction as pressure regulators, ordinarily embodying a diaphragm or bellows which acts against a spring to operate a valve. An instrument of the bellows type is shown in Fig. 8, this unit also being used as a pressure regulator. It finds wide application in the food processing industries for controlling the vacuum on vacuum-closing machines. Pressure is transmitted to the

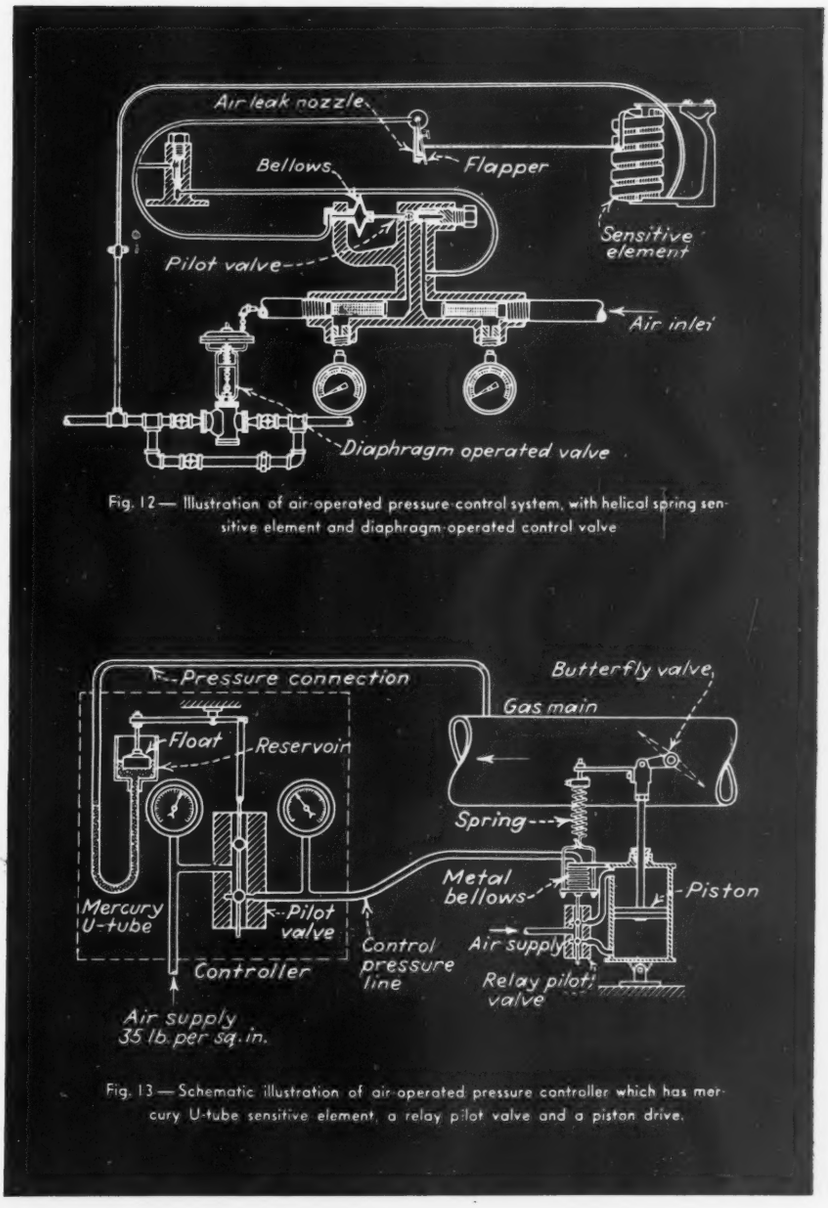


Fig. 12 — Illustration of air-operated pressure control system, with helical spring sensitive element and diaphragm-operated control valve

Fig. 13 — Schematic illustration of air-operated pressure controller which has mercury U-tube sensitive element, a relay pilot valve and a piston drive.

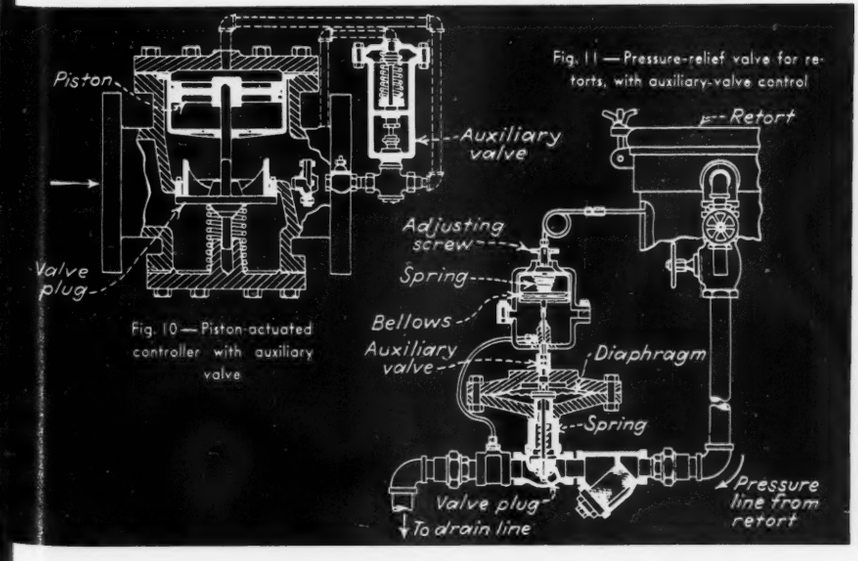


Fig. 10 — Piston-actuated controller with auxiliary valve

Fig. 11 — Pressure-relief valve for retorts, with auxiliary-valve control

bellows chamber through clearance around the valve stem, there being no packing used in this unit. For most sensitive control, however, a tube, or "feeler" pipe is connected to the bellows chamber and to the vacuum chamber of the vacuum closing machine. The valve of the regulator, of course, is installed in the vacuum line between the vacuum chamber and the vacuum pump. Of all metal construction, the unit in Fig. 8 has a double-seated balanced valve. The advantage of the balanced valve is obvious when sensitive accurate control is required, while the double valve seat has the attribute of giving a large opening for a relatively small amount of valve-stem travel. This regulator is the product of the Fulton Sylphon Co.

Vacuum and pressure are not always controlled by a valve in the line through which flows the fluid whose pressure is under control. Sometimes the speed of the pump producing the vacuum or pressure is regulated, this being accomplished by a valve that controls the amount of steam supplied to the pump engine. A regulator for controlling vacuum by this method is shown in Fig. 9. A unit of Waters Governor Co., it is diaphragm-actuated against a spring. The valve itself is installed in the steam line to the pump, and the diaphragm chamber is connected through a tube to the pipe or equipment in which the vacuum is maintained.

For pressure control where more power is needed to operate the control valve than is obtained with the self-acting type, but where a relatively simple and inexpensive control is desired, there can be used a self-operating regulator with an auxiliary valve that controls the force applied to the valve-operating piston or diaphragm. A piston regulator of this type made by McAlear Manufacturing Co. is shown in Fig. 10. As the reduced, or regulated, pressure falls below the control point, the auxiliary valve opens to permit application of pressure through a small pipe to the piston attached to the stem of the large valve. This pressure, in turn, forces the large valve open and

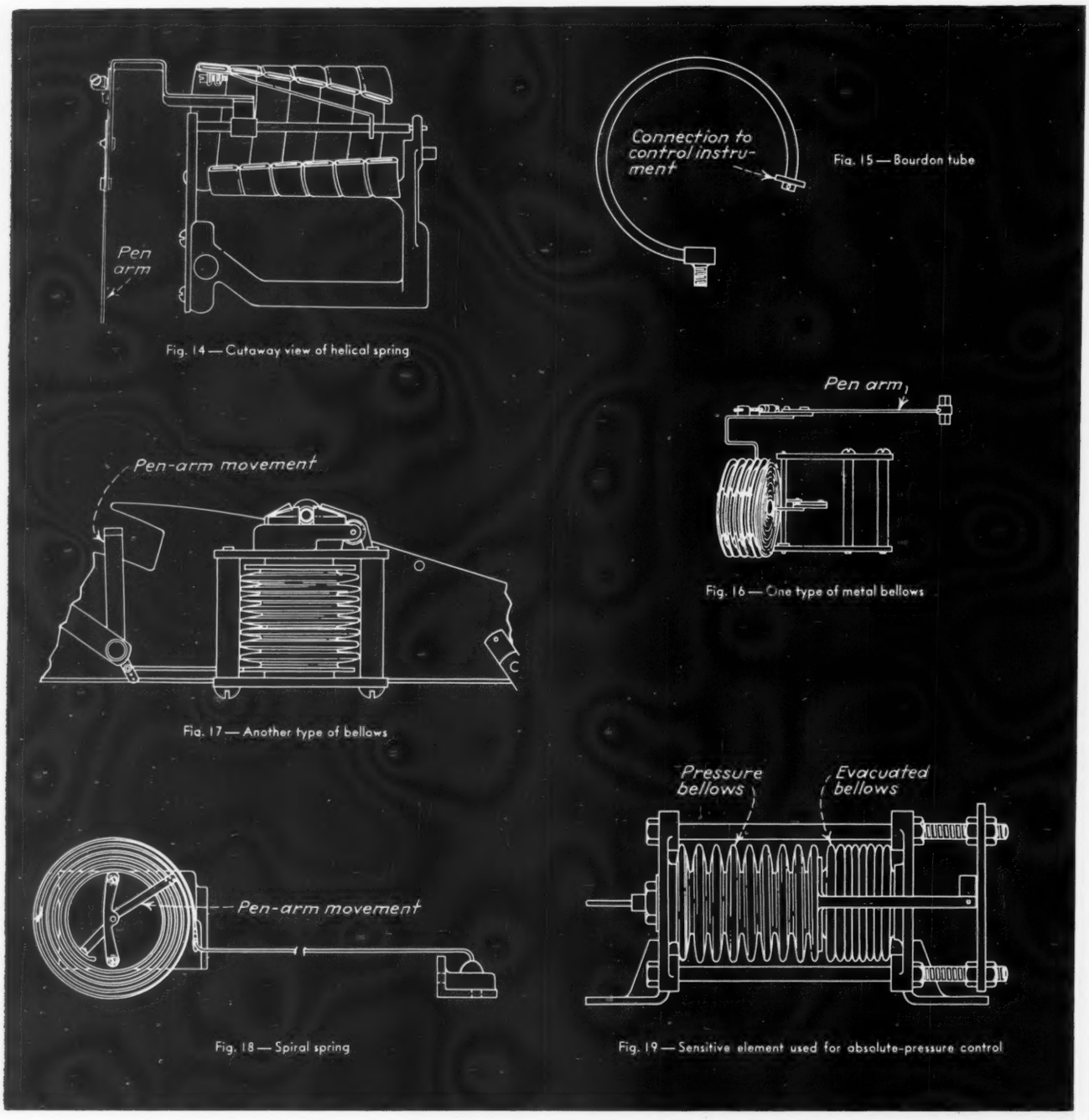


Fig. 14 — Cutaway view of helical spring

Fig. 15 — Bourdon tube

Fig. 16 — One type of metal bellows

Fig. 17 — Another type of bellows

Fig. 18 — Spiral spring

Fig. 19 — Sensitive element used for absolute-pressure control

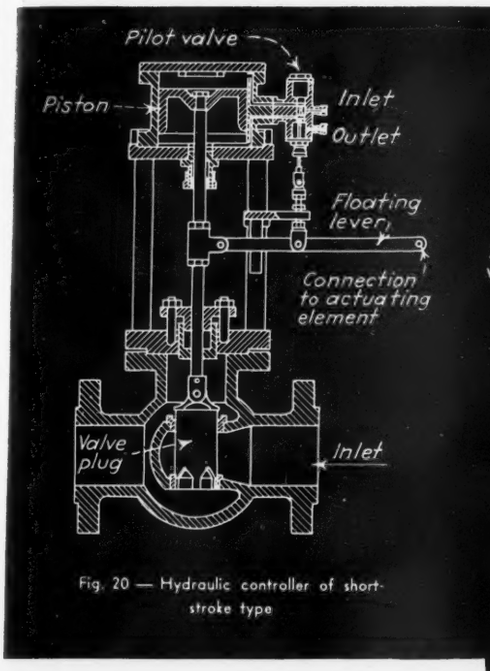


Fig. 20 — Hydraulic controller of short-stroke type

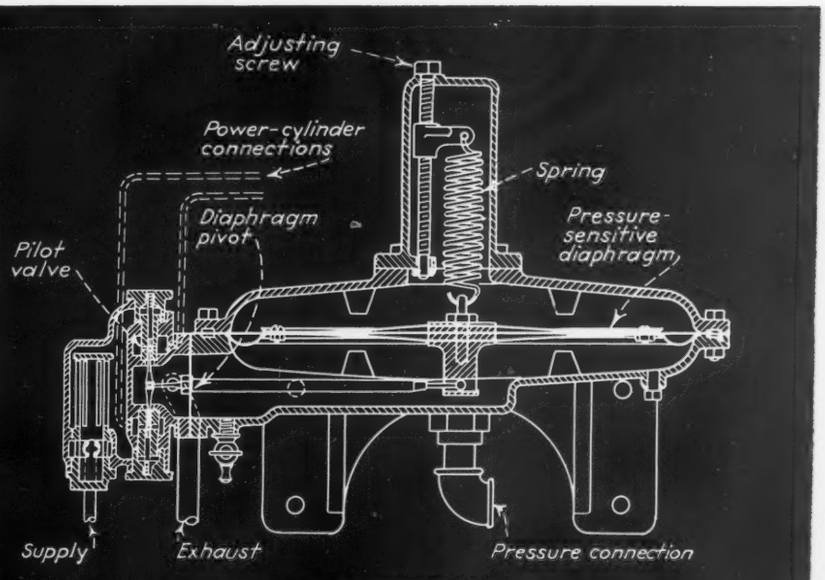


Fig. 21 — Highly sensitive, low-pressure hydraulic controller

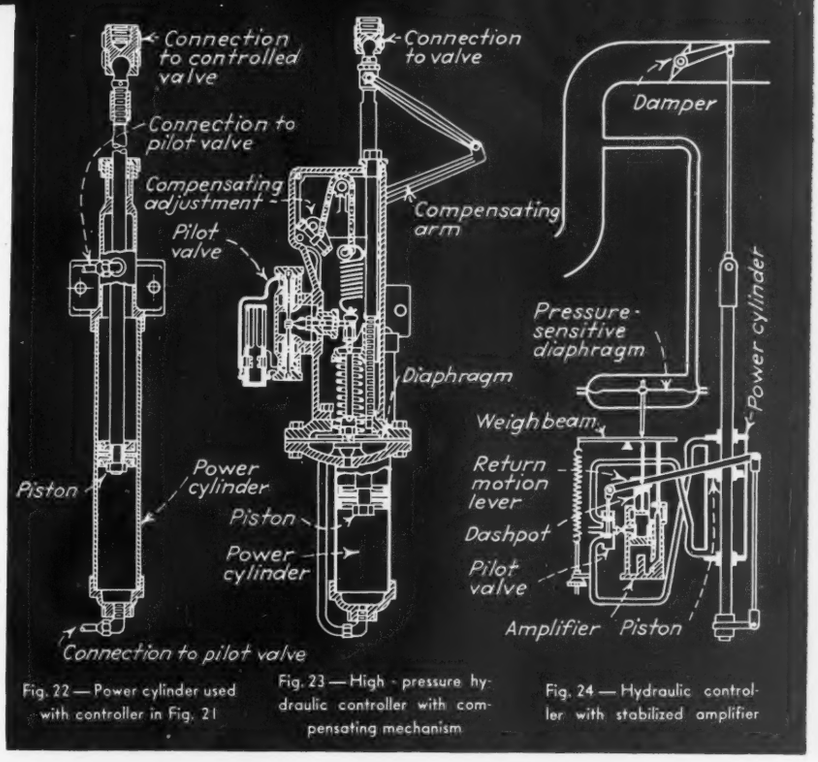


Fig. 22 — Power cylinder used with controller in Fig. 21

Fig. 23 — High-pressure hydraulic controller with compensating mechanism

Fig. 24 — Hydraulic controller with stabilized amplifier

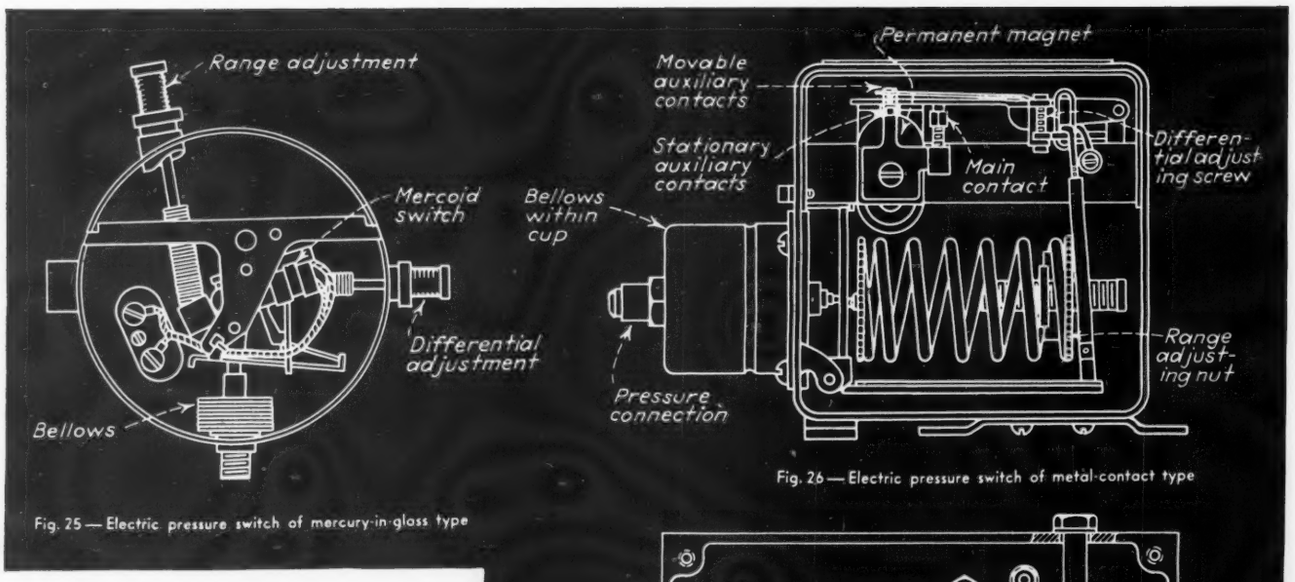
permits the reduced pressure to increase to the control point. It is obvious that such an arrangement makes the self-acting regulator approach the power-operated type in the characteristics of its performance, because a small, highly sensitive valve is used for the auxiliary controller, and a large, powerful actuating unit operates the large valve. A slight variation in the reduced, or regulated, pressure causes the pilot valve to open or close, so that the controller maintains the reduced pressure accurately. A controller of this type, of course, is intended for heavy-duty service, where the initial, or inlet, pressure is high and where high temperature and other severe conditions are encountered.

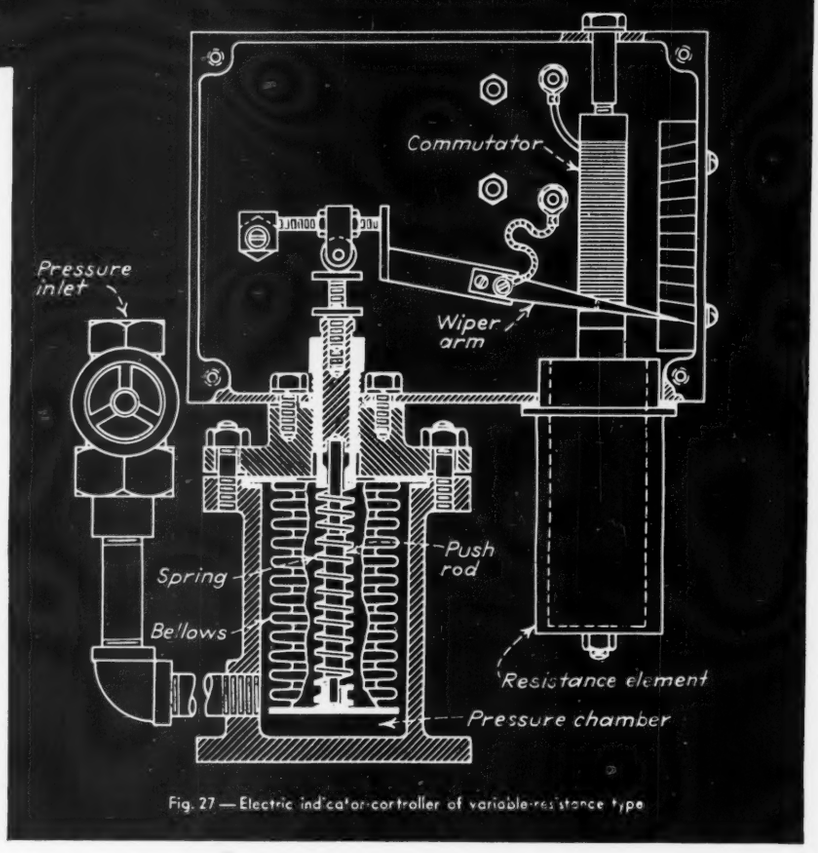
Better known in the food processing industries in the line of automatic pressure regulators with auxiliary-valve operation is the one shown in Fig. 11. Developed by Anchor Cap & Closure Corp., this unit is extensively employed in regulating the pressure in canning retorts. Basically, the controller consists of a valve operated by a large diaphragm opposed by a spring. Then there is the auxiliary valve that controls the bleeding of pressure from the diaphragm chamber, this valve being operated by a bellows opposed by a spring. The pressure of the retort is exerted on the bellows through a copper tube, and when the pressure reaches the control point, the pilot valve causes the large valve in the over-flow line to open and relieve the excess pressure.

Under normal retort pressure, the pilot valve is held closed by its spring, thereby preventing pressure from escaping from the space above the diaphragm, the pressure being transmitted into this space from the retort overflow line through small openings in the valve body and valve stem. This pressure above the diaphragm, indirectly acts to hold the main valve closed, but when the pressure in the retort becomes excessive, the bellows expands and opens the pilot valve, relieving the pressure above the diaphragm into the retort overflow pipe through a tube. The pressure in the retort then pushes against the diaphragm and opens the main valve to permit water to flow from the retort.

With the food industries becoming more conscious of the advantages of highly accurate control of process variables, power-operated pressure controllers are finding wider usage. This type of controller is not needed on all control jobs, but it is required on those where close, sensitive, accurate control is essential to the operation of the process or the quality of the product.

Power-operated controllers are of three general types, air, hydraulic and electric. In all of them, variations in the pressure being controlled are utilized not to operate the controlling valve but merely to actuate a small, sensitive pilot





valve or switch which controls the application of an outside source of power to the control valve. These differ from the self-operating controllers with the auxiliary valve in that the pressure applied to the controlling valve does not come from the process itself, and so is entirely independent of the conditions in the process.

As in the automatic regulation of temperature, air-operated controllers are widely employed in the food processing industries for the regulation of pressure. And, except for the sensitive element, the pressure controllers are practically the same as those for temperature. That is, they consist, usually, of a pilot valve which admits compressed air, usually at a pressure of 25 lb. per sq.in., to a diaphragm or piston-operated valve to effect control of the flow, and hence the pressure, of the fluid which is under regulation. Fig. 12 shows schematically a complete air-operated control system. Made by Foxboro Co., this controller is, in so far as fundamental principles of operation are concerned, the same as those made by a number of other instrument manufacturers for food process work. It consists of a helical tube that uncoils with an increase in pressure and coils up as the pressure falls, one end of this tube being closed and the other connected to the pipe or equipment in which pressure is being controlled. The closed end of the helical tube is connected through a mechanical link to a flapper that covers an air-leak nozzle. As the pressure increases and the helical tube uncoils, the flapper is moved closer to the nozzle, so that less air escapes. This causes air pressure to build up in the bellows which operates the pilot valve, moving the valve to the right. This movement reduces the flow of compressed air to the chamber above the diaphragm in the controlling valve and permits air already acting against the diaphragm to escape, thereby reducing the pressure against the diaphragm and permitting the main valve to be closed by a spring. Closing the main valve, of course, reduces the pressure in the pipe on the delivery side of the valve. Then as the pressure in that pipe decreases below the control point, the helical tube sensitive element coils up and causes the pilot valve to be moved in the opposite direction so as to admit air to the diaphragm and force the controlling valve open. In actual service, the controlling valve is ordinarily never completely closed nor completely open, but "floats" or "throttles" about the mid-open position in response to slight variations in pressure.

As in the case of automatic temperature controllers (See Automatic Control of Temperature in Continuous Processes, FOOD INDUSTRIES, August, 1936), various refinements are available for these air-operated controllers to make them highly accurate under severe operating conditions. These refinements include such things as mechanisms for automatically resetting the control point, relays for amplifying the force which actuates the controlling valve and adjustments for throttling range and sensitivity. For the most part, however, all the refinements are not needed in automatic control of pres-

sure in food process operations. But the food engineer should know that they are available and that they serve a very worth-while purpose when conditions demand them.

Similar in purpose and effect but different in construction is the air-operated controller illustrated in Fig. 13. Developed by Bailey Meter Co., this controller is equipped with a mercury U-tube pressure-sensitive element. A metal float rides on the mercury and moves up as the pressure increases and down as it decreases, and the float is connected to the pilot valve which controls the flow of compressed air to a metal bellows. This bellows operates a relay pilot valve that controls the admission of compressed air to either side of a piston that drives the controlling valve or damper. With the relay valve in one position, air is admitted to one side of the piston and exhausted from the other side, causing the piston to move. With the relay valve in the opposite position, the opposite action takes place and the piston moves in the other direction. The diagram of this controller shows a spring which is connected to the piston rod and to the bellows operating the relay pilot valve. This has the effect of compensating for the position of the piston and stabilizing its movement to give close control with less hunting for the control point.

The helical tube pressure-sensitive element used with the control system in Fig. 12 is widely used in pressure-control work in the range of pressures encountered in food processing operations, and details of its construction are shown in Fig. 14. This cutaway view shows the shape of the tube and one method of connecting the closed end to an arm which moves a pointer or pen and also operates a pilot valve. In this case, the end of the tube is connected to a rod

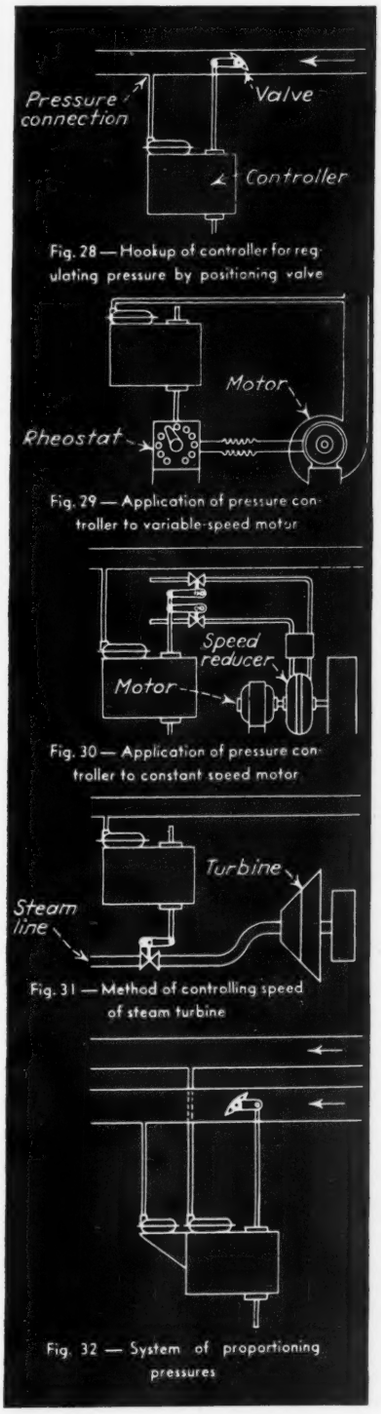


Fig. 28 — Hookup of controller for regulating pressure by positioning valve

Fig. 29 — Application of pressure controller to variable-speed motor

Fig. 30 — Application of pressure controller to constant speed motor

Fig. 31 — Method of controlling speed of steam turbine

Fig. 32 — System of proportioning pressures

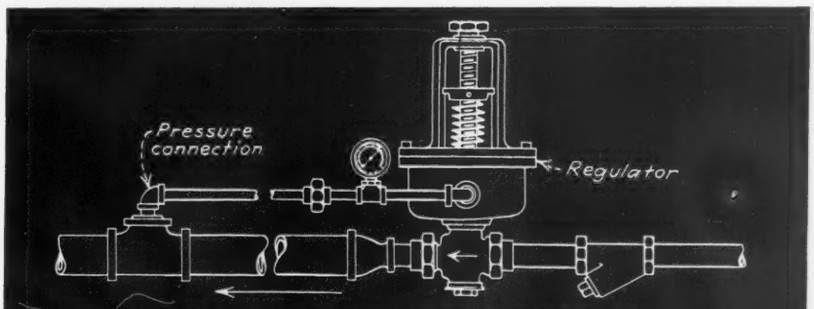


Fig. 33 — How self-acting pressure regulator is installed in steam line

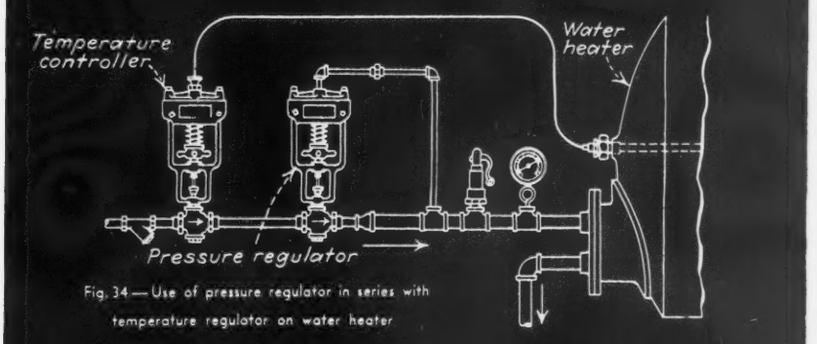


Fig. 34 — Use of pressure regulator in series with temperature regulator on water heater

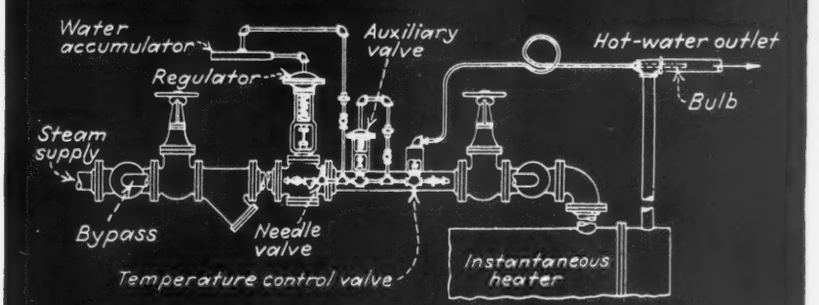


Fig. 35 — Controlling pressure and temperature by use of one large valve, an auxiliary pressure valve and a small temperature regulator

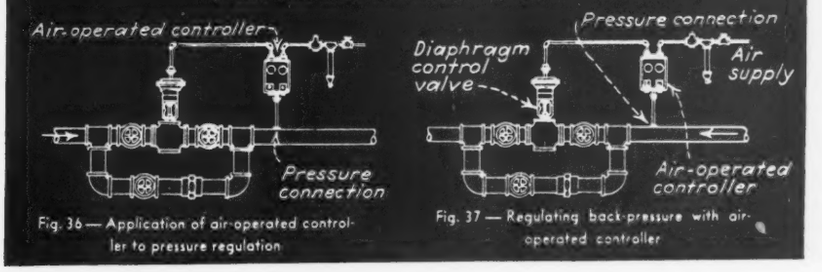


Fig. 36 — Application of air-operated controller to pressure regulation

Fig. 37 — Regulating back-pressure with air-operated controller

passing through the axis of the helix, the pointer also being connected to this rod. But in some instruments the end of the helical tube is connected directly to the pointer or to the pen arm which moves the pilot valve or an air-leak flapper. The element in Fig. 14 is that of Foxboro Co.

Other pressure-sensitive elements also are used in air-operated controllers. Among these is the Bourdon tube (Fig. 15), which has particularly wide application in high-pressure work but is not so commonly employed in the range of pressures found in food processing operations. Then there are the metal bellows, shown in Fig. 16 (a Foxboro unit) and Fig. 17 (a Brown Instrument Co. unit), and the spiral spring illustrated in Fig. 18 (a Foxboro unit).

Different instrument engineers differ as to the best sensitive element to use under different operating conditions. To take an example, however, Foxboro Co. recommends its bronze diaphragm-spring bellows (Fig. 16) for partial vacuum, for pressure and for compound vacuum and pressure ranges equivalent to less than 8 lb. per sq.in. For partial vacuum, pressure and compound vacuum and pressure ranges equivalent to 8 to 15 lb. per sq.in., the bronze spiral tube is recommended. For full vacuum, pressure and compound vacuum and pressure ranges equivalent to 15 to 29 lb., the bronze helical tube is the choice. And the same pressure-sensitive element is recommended for pressure and compound ranges equivalent to 30 to 200 lb., with a steel helical tube as alternate choice. For pressures from 201 to 500 lb., steel or bronze helical tube is the sensitive element recommended. Pressures higher than these are not common in food processing control work, but the steel helical tube or the steel Bourdon tube are the ones recommended for pressures from 801 to 4,000 lb. From 4,001 to 20,000 lb. the steel Bourdon tube is the choice.

All of the sensitive elements mentioned above are for instruments which indicate, record or control "gage" pressures. But for instruments which indicate record or control on the basis of the absolute pressure, some provisions must be made in their construction to compensate for barometric pressure variations. A special sensitive element for absolute-pressure instruments made by Foxboro Co. is shown in Fig. 19. This element consists of two metal bellows, one of which (the one on the left in the illustration) is acted upon by the pressure being regulated. The other bellows is exhausted and sealed, so that it contracts or expands as the barometric pressure varies. The two bellows are mounted so that they oppose one another. So the tendency of the one acted upon by the controlled pressure to expand when the barometric pressure drops is counteracted by a similar but

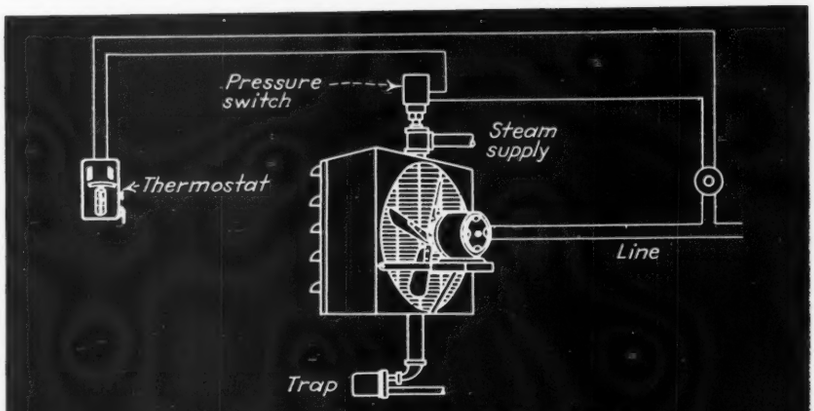


Fig. 38 — Use of electric pressure switch on unit heater

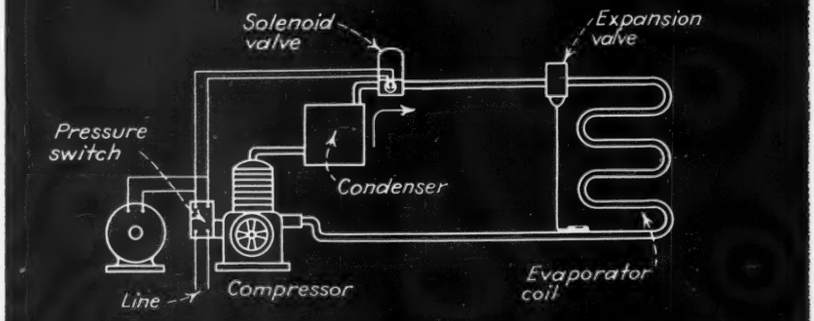


Fig. 39 — Regulating refrigerating system with pressure switch and solenoid valve

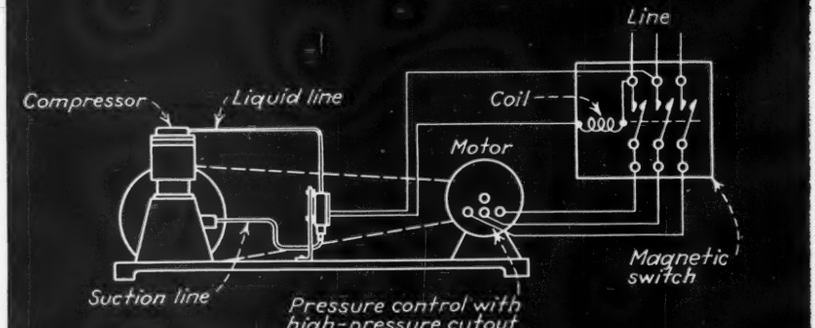


Fig. 40 — Use of electric pressure control with high-pressure cut-out on refrigerating system

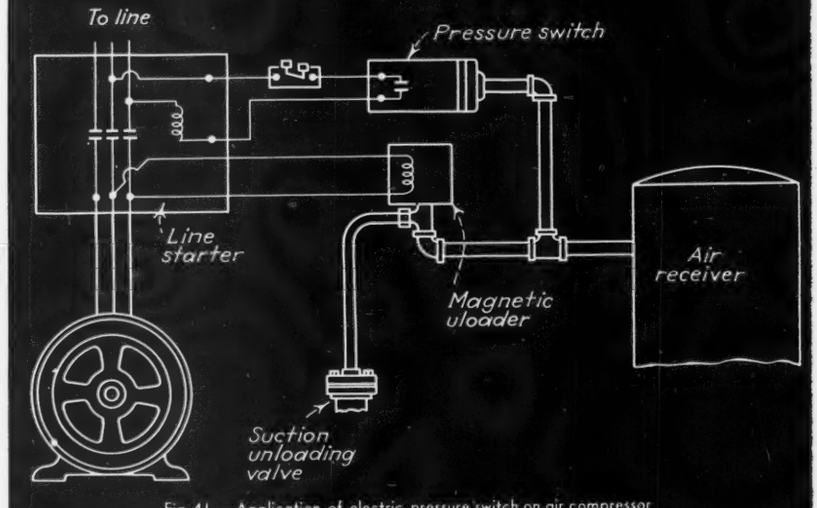


Fig. 41 — Application of electric pressure switch on air compressor

opposing expansion of the evacuated bellows. On a rise in harometric pressure, both bellows tend to contract, so the counteraction is still effective. Sometimes in absolute pressure instruments the two bellows are mounted separately rather than in the same frame, but both are connected to the pilot valve actuating linkage in such a way as to oppose the movement of one another with changes in barometric pressure. Such an arrangement is used by the Bristol Co.

Still another type of sensitive element is used in some instances in controllers built for low pressures but which may be subjected to higher pressures from some temporary outside disturbance. The element used under this condition is a spring-opposed bellows, the spring protecting the bellows during surges. With an ordinary pressure-sensitive element, designed to handle the minimum, normal and maximum pressures, the normal pressure reading would be too close to the center of the chart to give the highest satisfaction in regard to ease of reading and accuracy of indication.

The spring-bellows sensitive element also can be used in a recording and controlling pressure gage when it is desired to have the pen control over only a portion of the total range. Thus, the pen can rest on zero until, at the desired pressure, the movement picks up the pen and actuates it as in any other instrument.

Although compressed air sometimes is used to operate valve motors of the piston type, as mentioned previously, more often hydraulic pressure is the medium employed with this kind of controller. In any case, the sensitive element of the controller is used to operate a pilot valve as in the air-operated instruments, the pilot valve controlling the pressure applied upon the piston to operate a valve, damper rheostat or other device.

In Fig. 20 is shown a piston-type valve motor made by Northern Equipment Co. and known as a Copes controller. This is a short-stroke hydraulic operated valve with the pilot valve attached to the cylinder in which the piston operates and the whole assembly mounted upon the valve body. Movement of the pressure sensitive element (not shown) shifts the position of the pilot valve so as to admit the oil to one side of the piston and exhaust it from the other, forcing the piston and the valve to which it is attached to the position necessary to correct the pressure under control.

Hydraulic pressures of 50 to 100 lb. per sq.in. may be used to operate this valve, which, together with the large piston area, assures ample power to move the valve to the proper position with accuracy, regardless of the pressure drop across it.

As may be seen in the illustration, the lever which actuates the pilot valve and to which the sensitive element (a bellows) is connected, is attached to the piston rod. With this arrangement, movement of the piston and valve to correct the pressure also moves the pilot so as to cut off the power applied to the piston before it travels so far as to over-correct the pressure and cause hunting.

Also of the hydraulic type is a highly sensitive low-pressure controller shown in Fig. 21. The sensitive element of this controller is a large-area, spring-opposed diaphragm. This diaphragm is connected to a pilot valve through a lever which pivots in a diaphragm to form a low-friction movement, this diaphragm also serving to separate the pilot-valve exhaust chamber from the chamber in which the pressure-sensitive diaphragm is located. The pilot valve operated by this unit controls the supply of oil under pressure to a long stroke, double-acting power cylinder which operates the valve that controls the pressure, the power cylinder being shown in Fig. 22.

THIS PARTICULAR CONTROLLER will automatically control pressures between 1 in. (water column) above and 1 in. below atmospheric, and it is guaranteed to maintain the pressure within a variation of 0.01 in. It is also made in other ranges, such as from 3 lb. above to 3 lb. below atmospheric pressure.

A different model of this controller is illustrated in Fig. 23, this one being for high-pressure control, and suitable for regulating pressures between absolute and 600 lb. gage. The diagram shows the entire controller, including the pressure-sensitive diaphragm (which is considerably smaller than that in the low-pressure model) and the pilot valve and power cylinder. Being a high-pressure controller, a device is built into it to compensate the pilot valve. This consists of an arm connected to the shaft of the power piston and to the shaft of the pressure-sensitive diaphragm through a chain and a spring.

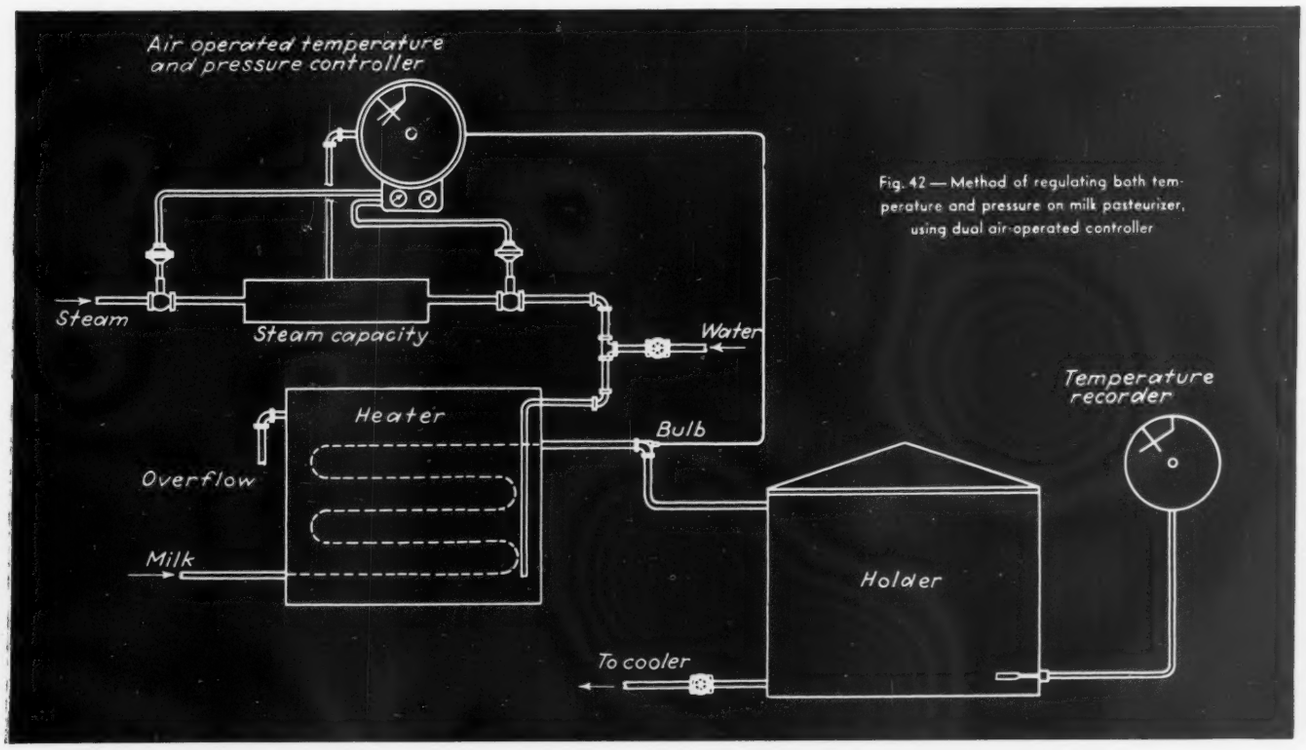


Fig. 42 — Method of regulating both temperature and pressure on milk pasteurizer, using dual air-operated controller

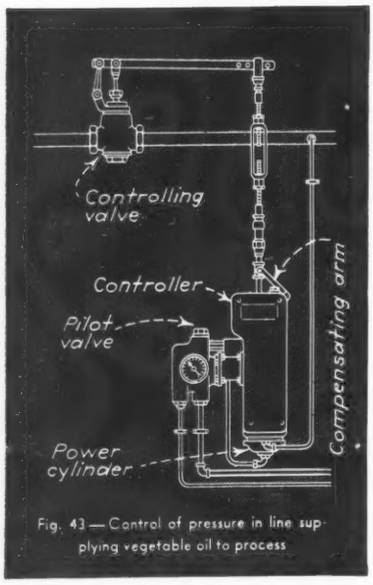


Fig. 43 — Control of pressure in line supplying vegetable oil to process

When a change in pressure causes the power piston to move, this movement changes the spring tension acting on the control diaphragm, this having the effect of bringing the power-cylinder piston rod to rest at that position at which the desired pressure under control has been restored, and avoiding over-correction or hunting.

A hydraulic pressure controller involving many refinements which make for sensitive and accurate operation is one made by the Smoot Engineering Division of Republic Flow Meters Co. Shown in Fig. 24, it is actuated by a large diaphragm which serves as the pressure-sensitive element. This diaphragm operates a weighbeam, which is pivoted on a knife-edge fulcrum and the movement of which is opposed by a spring that is adjustable for varying the control point. As this beam moves it operates a stabilized hydraulic power amplifier and pilot valve, controlling the flow of oil under pressure to a power cylinder which operates the valve or damper being controlled.

The amplifier of this controller is a differential piston operating in an oil cylinder. Admitted to the chamber above the piston, the oil flows through an orifice into the chamber below and out through a multiplying valve, the position of which is controlled by the weighbeam. This multiplying valve has the same opening as the orifice when balanced, so as soon as it is throttled down, pressure builds up under the piston and moves it upward. If the multiplying valve lifts, the pressure builds up above the piston and moves it downward. With this arrangement, a sensitive weighbeam is made to control a large force.

To take care of the lag between the time the control valve is moved and the time the controlled quantity changes in response, a stabilizing device is used to balance the weighbeam during this interval. This is accomplished by the addition of a dash pot, built into the amplifying piston. This consists of a cylindrical well filled with oil and a small plunger which is connected to the weighbeam. A small orifice in the plunger allows the oil to flow from one side of the plunger to the other, the orifice being adjustable so that the strength of the dashpot action can be varied. With this stabilizer, any motion of the amplifier piston resulting from motion of the weighbeam acts through the dashpot to balance the beam, anticipating return of the controlled pressure to normal. This prevents over-travel.

Movement of the amplifier piston operates the pilot valve controlling the flow of oil to the power element which actuates the valve or damper being controlled. This pilot valve admits oil to one side of the power piston while allowing that on the other side of the piston to drain, causing the piston to move.

The movements of the power piston and the pilot valve are so synchronized that when the piston has reached its new control point, the pilot valve will be in the mid-stroke, or off, position, thereby holding the piston stationary at the control point. This synchronization is effected by a lever which connects the pilot valve, the amplifier piston and the power piston.

This controller is made as sensitive as 0.001 in. of water. The power cylinder used with it will deliver from 360 to 5,600 ft.-lb. per stroke, and will make a full stroke in 2.4 seconds.

Inasmuch as electricity is a convenient source of power in all industrial establishments, electrically operated controls for pressure frequently are employed. With these, no auxiliary power-generating equipment, such as air compressors for pneumatic instruments or oil pumps for hydraulic controls are

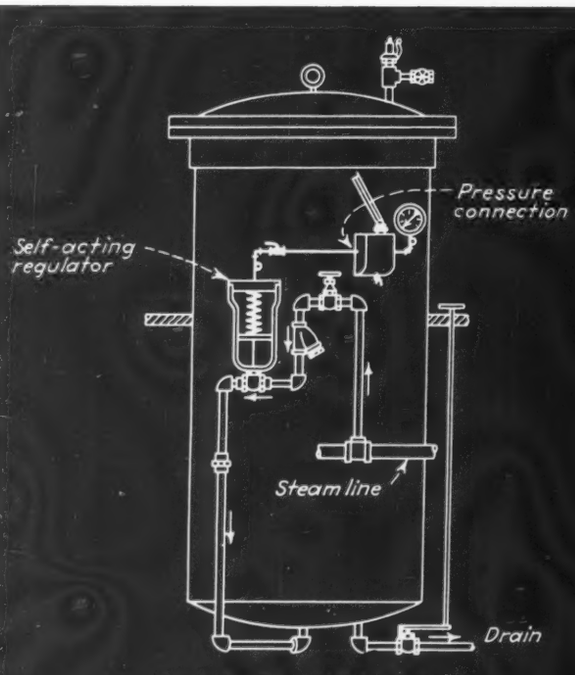


Fig. 44 — Installation of self-acting regulator on retort

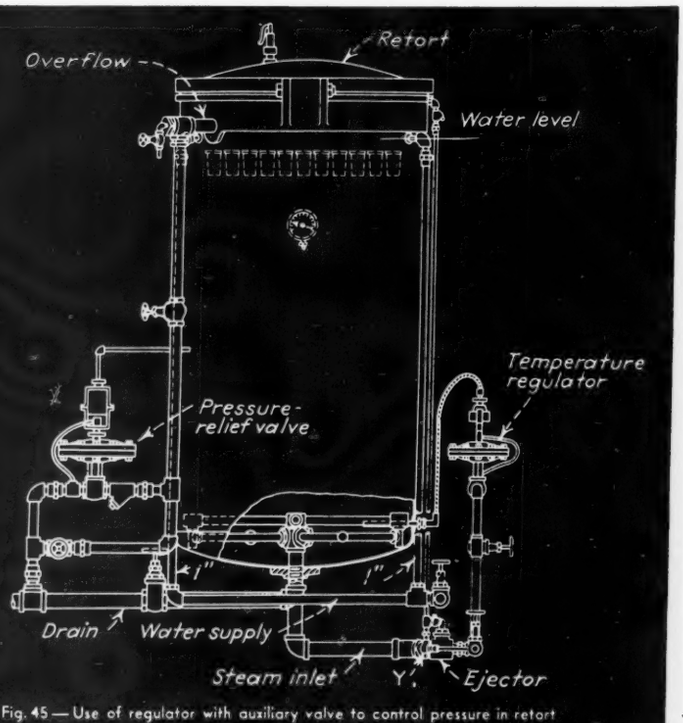


Fig. 45 — Use of regulator with auxiliary valve to control pressure in retort

required. Sometimes, however, the electrically driven valve is more costly than one operated by a diaphragm or piston and propelled by air or oil under pressure.

Electric controllers consist essentially of a pressure-sensitive element, a switch of the metal-contact or mercury-in-glass type (this being operated by the sensitive element) and a pressure-regulating valve which is driven by an electric motor or operated by a solenoid, the electric switch controlling the supply of power to the motor or solenoid. Where a large amount of power is required to operate the valve, some type of relay is used between the pressure-operated switch and the valve-actuating motor.

THE PRESSURE-SENSITIVE ELEMENTS used with electric controllers can be any of those previously described in connection with the air-operated and hydraulic controls, it merely being necessary to connect these elements to a switch. However, the diaphragm and bellows perhaps are the most commonly used sensitive elements in electric controls. The motor and solenoid-operated valves are the same as those used with temperature controls and described in Automatic Control of Temperature in Batch Processes, FOOD INDUSTRIES, May, 1936, and in Automatic Control of Temperature in Continuous Processes, FOOD INDUSTRIES, August, 1936.

The construction of an electric pressure controller using a mercury-in-glass switch is shown in Fig. 25, this being a Mercoid unit made by American Radiator Co. In this instrument a change in pressure expands or contracts a metal bellows to actuate a tripping mechanism that tilts the mercury switch to make and break contact and operate the electrically driven pressure-regulating valve. Two adjustments are provided in this controller, one being to regulate the range of pressure and the other the difference between the pressures at which the control cuts in and out. Actually the one sets the "low" point of control and the other the "high" point.

A line of controls similar to that shown in Fig. 25 is also made by Minneapolis-Honeywell Regulator Co. This line includes vacuum, vapor-pressure, low-pressure and high-pressure controllers, covering a range from 22 in. of vacuum to 195 lb. gage. One of these controllers, used on refrigerating machines, has two bellows, or pressure-sensitive elements. One is connected in the compressor suction line to give on-and-off control, while the second is connected to the high-pressure side to shut off the compressor motor when dangerous pressures develop.

An example of the metal-contact pressure and vacuum controllers is represented in Fig. 26. This is a Westinghouse unit with a metal bellows that opens and closes the contacts through a special linkage, acting against a heavy coil spring the compression of which is adjustable for variation of the control point. To permit variation of the differential between the cutting-in and cutting-out pressures, an adjustment is provided in the linkage.

Pressures up to 500 lb. can be controlled by the line of Westinghouse electric controllers, the power rating of which is 2 hp. on 110-volt a.c. power, single-phase.

Referring to Fig. 26, it is seen that the metal-contact controller illustrated has a permanent magnet to give snap action in making and breaking contact so as to avoid arcing and chatter.

In a metal-contact indicator-controller built by Westinghouse, two Bourdon-tube sensitive elements are used. Operating through gears, one of these positions the pointer for pressure indication and the second makes and breaks the metal contacts, the purpose of the two tubes being to reduce the work done by either of them and thereby provide greater accuracy and sensitivity in control and indication. In this controller, the pressure-actuated contact moves between adjustable "high" and "low" contacts, and the latter can be moved close together or far apart to give a large or small differential between the cutting-in and cutting-out pressures.

AN UNUSUAL TYPE of electrical instrument for measuring and controlling pressure is shown in Fig. 27. Built by Republic Flow Meters Co., it varies the resistance in an electrical circuit in proportion to the pressure acting on its sensitive element, thereby varying the flow of current in the circuit in proportion to the pressure. The variation in current is utilized to operate an electrical indicating or recording mechanism. For effecting automatic control, arrangement is made so that the contact arm which varies the resistance, makes and breaks contacts at the high and low pressure points.

This instrument has as a sensitive element a metal bellows opposed by a spring. As the bellows compresses or expands, it actuates a pushrod which moves a "wiper" arm over a commutator, the commutator consisting of alternate disks of copper and insulating material. Each copper disk is connected to a fixed electrical resistance, the resistances being wound on three concentric coils and taps being taken off at the various disks, or contacts.

As the wiper arm moves across the commutator due to a change in pressure, it regulates the resistance in the instrument circuit so as to indicate or record the pressure. And as adapted for automatic control, movement of the wiper arm operates a mercury switch which has a current capacity of 10 amperes at 110 volts, a.c. or d.c.

The indicating and recording ammeter used with this instrument is similar to a standard indicating and recording ammeter, except that the retarding spring is replaced by an electromagnet, this being done to eliminate any effect of voltage variation.

Something new in electrical controllers, an electronic regulator, has been developed by Brooke Engineering Co. In this regulator, pressure changes move

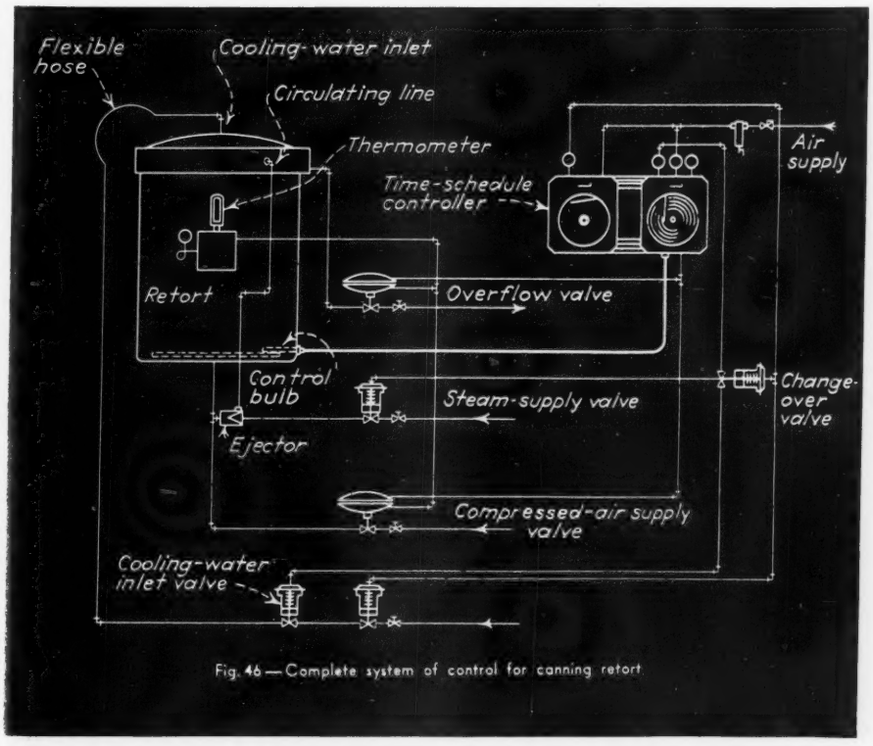


Fig. 46 — Complete system of control for canning retort

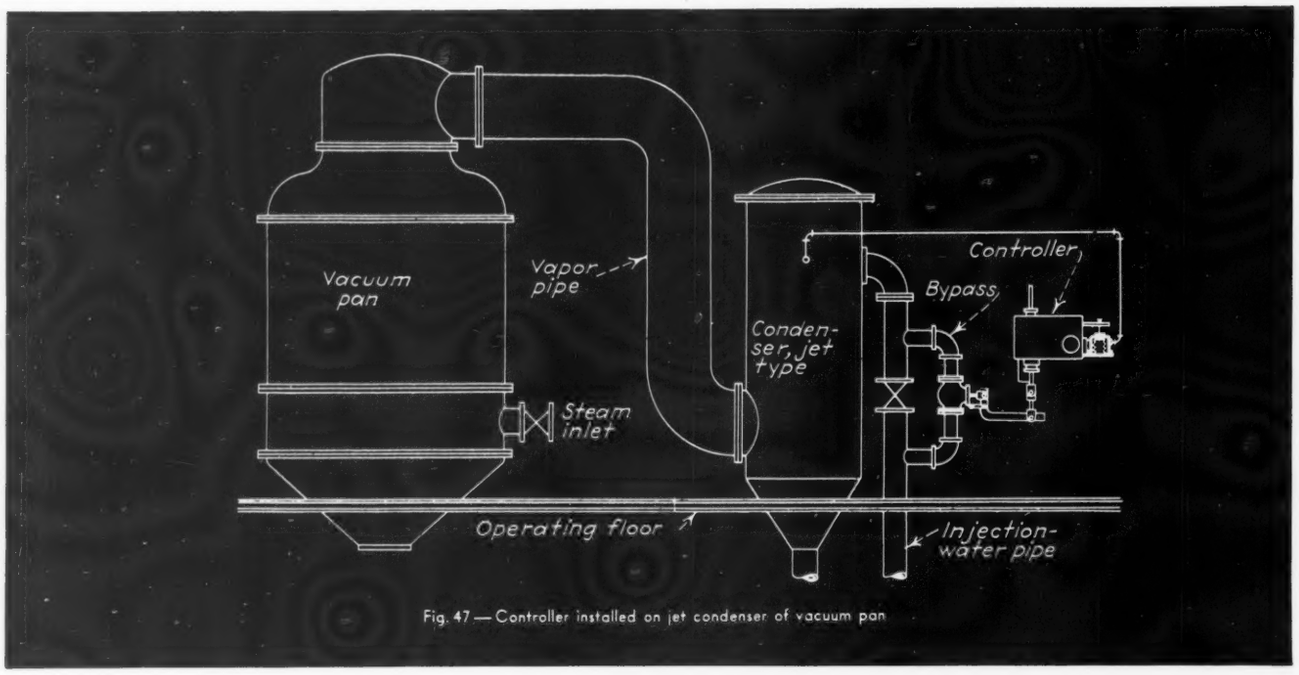


Fig. 47 — Controller installed on jet condenser of vacuum pan

an iron core in an electrical coil to vary the induced current in the coil. This variation in current acts through a Wheatstone bridge circuit, the unbalance of which is amplified by vacuum tubes and applied to the grid circuit of General Electric thyratron tubes. These tubes then control the forward or reverse motion of a motor-gear unit. Built in several sizes, the motor gear unit provides a torque from 50 to several hundred foot-pounds for the operation of valves, dampers and other pressure regulating devices.

Perhaps the most novel feature of this controller is that in addition to having throttling and "trend" types of compensation, it is also equipped with "modulated approach." This means that the speed of the motor mechanism is directly proportional to the amount of variation in the pressure away from normal. As the pressure approaches normal, the speed of the motor decreases in corresponding ratio. With this type of controller, extreme sensitivity is obtained, yet hunting is eliminated.

Widely used in the power field is a compensated steam-pressure regulator made by Brooke Engineering Co. In this controller, pressure actuates a diaphragm which operates against weights to actuate an electric switch, the switch controlling a 1/25-hp. motor that drives a valve or damper-operating arm through a train of gears. Mercoid switches stop the motor as the control arm reaches the limit of its travel.

Various ways in which pressure control can be accomplished are illustrated in Figs. 28, 29, 30, 31 and 32, these diagrams having been prepared by Smoot. Fig. 28 shows the regulation of a damper, which might also be a valve, butterfly valve, louvres or other device controlling the flow of the medium the pressure of which is under regulation. Here the pressure-sensitive element is connected to the pipe in which the valve is located, on the discharge side of the valve.

The method of regulating pressure by controlling the speed of a fan or blower motor through operation of a rheostat is illustrated in Fig. 29. Here the pressure-sensitive element is connected to the pipe on the discharge side of the blower, and the power piston in the controller shifts the position of the rheostat through a rack and pinion to change the resistance, and consequently the speed, of the motor driving the fan so as to maintain the pressure at the desired figure. This same method can be applied to pumps and compressors where they are driven by a variable-speed motor.

Control with a constant-speed motor can be obtained as indicated in Fig. 30 when a hydraulic coupling is used between the motor and the fan, compressor or pump. Here the controller manipulates valves to vary the speed-transmission ratio of the hydraulic coupling.

The pressure delivered by a turbine-driven fan, pump or compressor can be controlled by the arrangement illustrated in Fig. 31. Here the regulator operates a valve in the line supplying steam to the turbine, admitting more steam as the pressure falls and less steam as the pressure rises. If desired, this control can be used to regulate the speed of the fan by operating the governor valve.

Fig. 32 represents the type of control that may be employed to regulate one pressure in relation to another, and hence control the amount of fluid flowing in one line in proportion to the amount in the second line. Called proportioning, this application employs a regulator with two sensitive elements, each connected to one of the pipes and the one opposing the action of the other in operating the pilot valve of the controller. In this particular regulator, a Smoot unit, the two sensitive elements act on opposite ends of a weighbeam (see Fig. 24), and the ratio between the two pressures and the two flow volumes can be varied by moving the fulcrum of the beam nearer to one element and farther from the other. It should be noted that this controller actuates a valve, or damper, in only one of the two lines, increasing the pressure and the flow in that line as the pressure and flow increases in the other and decreasing it if that in the other line decreases.

Many pressure control problems, however, do not require complicated equipment such as used in the above applications. Often installation of self-operating regulators will give sufficiently close control. Fig. 33 shows, for example, the means of controlling pressure in a steam line. This is a self-acting unit made by Fulton-Sylphon, the valve body being connected into the line, and a "feeler" tube being tapped into the pipe on the downstream side at a distance of about 10 ft. This feeler pipe is not necessary, but with it better control is obtained. In this particular regulator, pressure is transmitted through the valve body to the pressure chamber where the bellows is located.

Another simple control application, and one in which both temperature and pressure regulators are used, is on a water heater (Fig. 35). In this application, a self-operating temperature regulator is installed ahead of a self-operating pressure regulator in the line supplying steam to the heater. The problem in this case is to accurately

control automatically the temperature of the water in the heater. But by using the pressure regulator in series with the temperature controller, not only is better control of temperature obtained, but a smaller and less expensive controller can be employed. Both of these controls are Fulton Sylphon units.

Another simple control application, and one in which both temperature and pressure regulators are used, is on a water heater (Fig. 35). In this application, a self-operating temperature regulator is installed ahead of a self-operating pressure regulator in the line supplying steam to the heater. The problem in this case is to accurately control automatically reducing steam pressure to the heater and at the same time controlling the temperature of the water.

In this installation, the main valve is of the self-operating type with an auxiliary valve, the main valve being held open by spring pressure and closed by the application of inlet steam pressure to the diaphragm. The auxiliary valve and the temperature-regulator valve are installed in a pipe which bleeds pressure from the diaphragm of the main valve. The diaphragm chamber of the auxiliary valve is connected to the low-pressure pipe line and the bulb of the temperature controller is in the hot-water outlet of the heater.

In operation, fluctuation in the reduced pressure causes the auxiliary valve to open or close to vary the pressure on the diaphragm of the main valve and position the valve so as to maintain the correct pressure. Then as the temperature of the water reaches the control point, the temperature regulator valve closes, allowing the pressure to build up on the diaphragm of the main valve to close the valve and shut off the supply of steam to the heater.

Made by McAlear Manufacturing Co. the control equipment used in this water-heater application is suitable for the control of water temperatures in either instantaneous or storage type heaters and is used in packing plants and other food factories.

THE APPLICATION of a simple and relatively inexpensive air-operated controller to the regulation of pressure in a pipe is shown in Fig. 36. A Bristol Co. unit, the control system consists of a non-recording, non-indicating regulator and a diaphragm-actuated valve, the sensitive element being connected to the pipe on the downstream side of the valve.

Fig. 37 represents the same controller as does Fig. 36 but in this case it is back pressure that is under regulation, and for this purpose the pressure-sensitive element of the controller is connected to the pipe on the upstream side of the valve.

A common application of an electric pressure controller to food-plant equipment is in the regulation of a unit heater to prevent the heater fan from operating when there is not enough pressure in the steam line to insure the delivery of warm air from the heater. In this installation (Fig. 38) the switch of the pressure unit is connected in series with a thermostat which controls the temperature and with the fan motor. In event of a steam supply failure, or at night when the steam is shut off, the pressure element in the controller holds the switch open and shuts off the power to the fan motor. The control shown here is a unit of Minneapolis-Honeywell Co.

Electric pressure controllers find wide application in refrigerating systems, such as shown in Fig. 39. As indicated in the diagram, the controller, or pressure switch, controls not only the compressor motor but a solenoid valve in the liquid-refrigerant line between the condenser and the expansion valve of the evaporator coils. The pressure switch can be set to cut out at 7 or 8 lb. and in at 34 to 36 lb. Operated in this manner, the compressor partially "pumps down" the evaporator at each operation, maintaining a low-pressure in the condensing unit and reducing the amount of seal-leakage trouble. This control is the product of Automatic Products Co.

Another refrigeration application of electric pressure switches is shown in Fig. 40. The pressure element of the controller is connected to the suction side of the compressor. As the pressure rises the pressure switch starts the compressor motor, then when the suction pressure has been reduced to the proper point, the switch turns off the motor. In addition, there is connected to the high-pressure side of the compressor a cut-out switch which stops the motor if the pressure becomes excessive. This system of control, which in the installation described here uses Minneapolis-Honeywell units, gives control and protection at the same time.

Air compressors find extensive application on food plants, air under pressure being employed for such services as conveying milk in a dairy and stuffing sausage in a meat plant. And, of course, air compressors are used as auxiliary equipment wherever air-operated controllers are installed. The system of controlling an air compressor by the use of electric pressure switches is shown diagrammatically in Fig. 41. In this application the switch turns the compressor motor on and off to keep the pressure at the desired figure. For

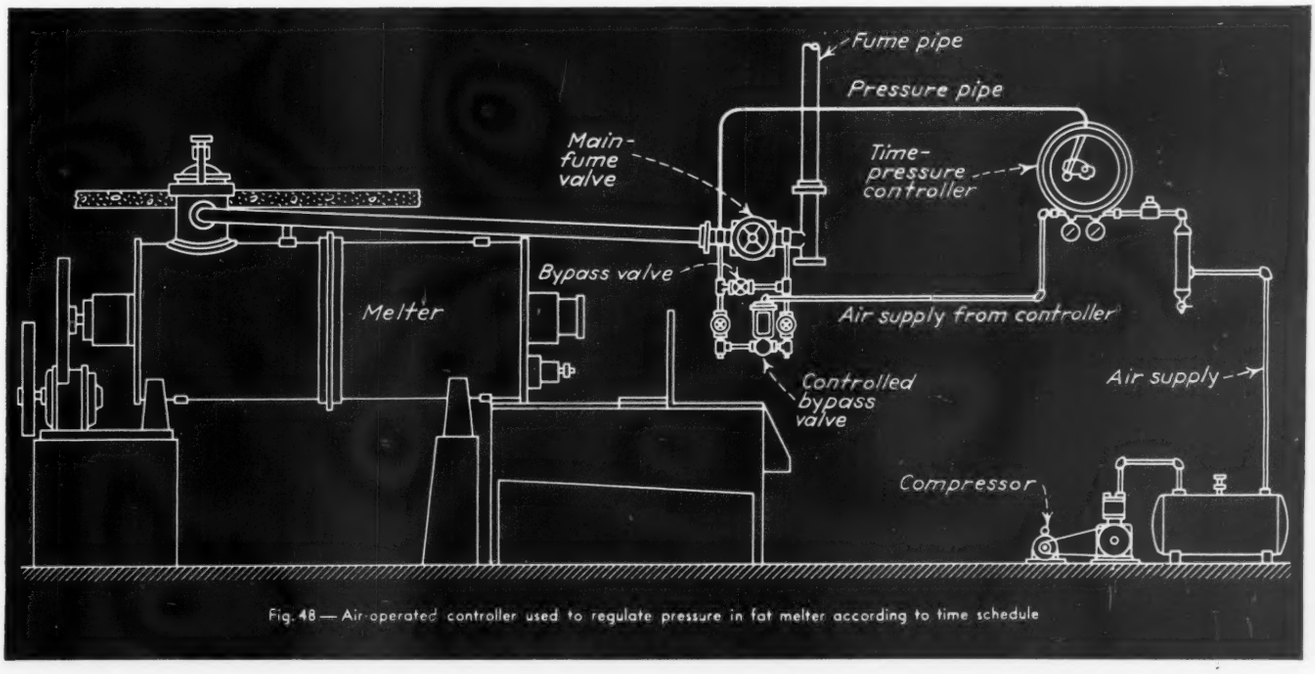


Fig. 48 — Air-operated controller used to regulate pressure in fat melter according to time schedule

motors of 5 hp., or less, the switches in this control system, designed by Gardner-Denver, will handle the entire motor current. But a magnetic motor starter is installed for larger motors and also frequently for motors of 3 to 5 hp. The diagram shows the magnetic starter, or line starter, and in addition illustrates the hook-up of a magnetic unloader for the compressor suction valves. Operated by a pressure switch, the unloader provides a delay of six seconds for the bleeding of air from the suction valve unloader diaphragm or plunger, thereby allowing the compressor time to accelerate to full speed before the load is applied.

In processes where accurate control of temperature is essential, it is good practice to use a combination of temperature and pressure controllers to regulate the flow of steam to the process. Milk pasteurization is an application of this type, and Fig. 42 represents the method of applying dual control to a heater-holder pasteurizer. The dual pressure and temperature controller, a Brown unit, is air operated, and both of the controlling valves are installed in the line supplying steam to the milk heater. The advantage of this arrangement lies in the fact that the pressure controller removes one of the variables in the process, pressure fluctuation, which causes variation in the rate of heat supply, and permits the temperature controller to perform with greater accuracy.

With more and more food processes being converted to continuous operation, there are coming to be many instances where it is important to regulate the pressure at which fluid ingredients are supplied to the process. One means of effecting this control is illustrated in Fig. 43, where an A. W. Cash Co. hydraulic controller operates a valve in a vegetable-oil supply line in the plant of Procter & Gamble Co. In this installation, the valve in the oil line is a 45-gal.-per-minute unit of the 1½-in., balanced, lever type. The end of the valve lever is connected to the shaft of the power-operated piston of the controller, and the pressure-sensitive element of the controller is connected to the oil line a short distance from the valve on the downstream side.

ONE OF THE EARLIEST and most widely used pressure-control applications in food processing, was made on canning retorts. The purpose was to regulate the temperature in the retort by maintaining the steam pressure at the corresponding value. Instrument engineers usually recommend the use of a temperature controller rather than a pressure controller for this application. But many retorts still are served by a regulator which maintains the steam pressure at about 10.3 lb. per sq.in. gage for the purpose of holding the temperature in the retort at 240 deg. F.

In earlier days, it was the practice to install one pressure regulator on the steam line supplying a battery of retorts, but this gives control so inaccurate as to be entirely unsatisfactory. Such an arrangement permits a different pressure to exist at each of the retorts due to varying pressure drops in the lines. So the least that the canner should do is to install individual pressure regulators on each retort, as shown in Fig. 44, where the controller represented is a Tagliabue self-operating unit of the diaphragm-actuated type. As will be seen from the diagram, the controlling valve is connected in the line supplying steam to the retort, and the diaphragm chamber is connected to a well in the side of the retort so as to detect variations in pressure.

With the arrangement shown in Fig. 44, the controller maintains a constant temperature only if the entrapped air has been properly vented from the retort at the beginning of the cook when the steam is first admitted. If air is trapped, the temperature will be lower than would be indicated by the pressure, which means that processing will not be properly done. Saturated steam has a definite temperature for each pressure, but this relationship does not hold for a mixture of air and steam.

Canners using this type of control find it good practice to keep the controller valve wide open, with no attempt to control, until the thermometer in the retort temperature well agrees with the pressure gage. This reduces the time required for bringing the retort to temperature because the flow of steam is not impeded by a partially closed valve. The importance of this is indicated by the fact that at a temperature of 240 deg., a variation of two to three degrees will make a difference of ten to twelve

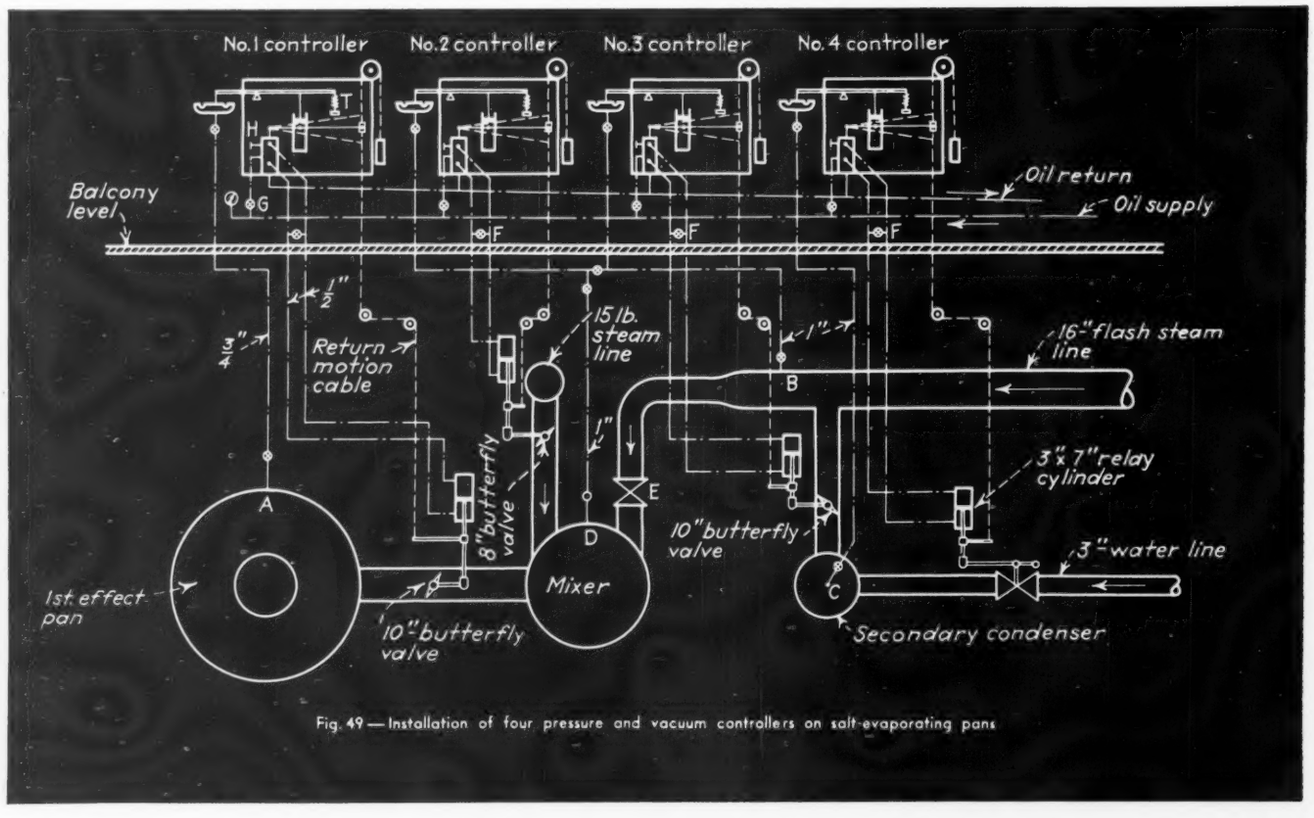


Fig. 49 — Installation of four pressure and vacuum controllers on salt-evaporating pans

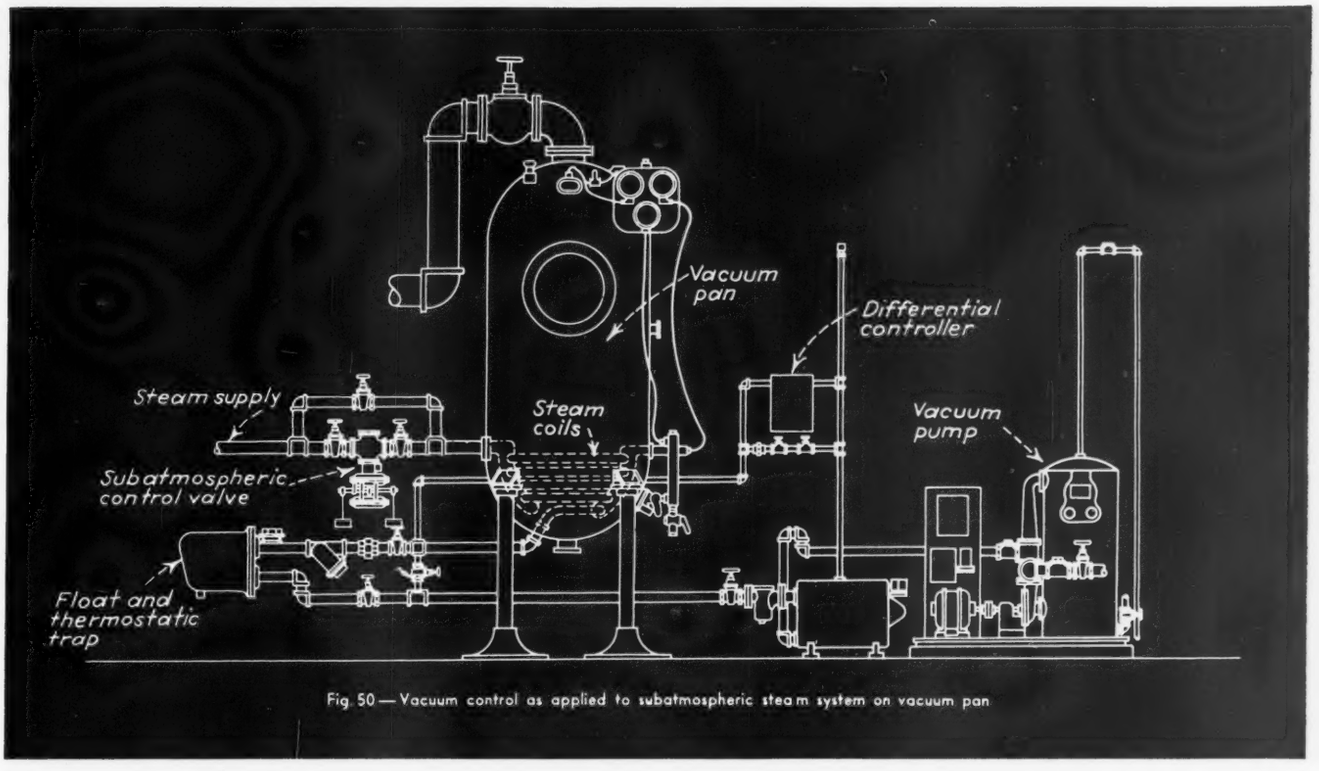


Fig. 50 — Vacuum control as applied to subatmospheric steam system on vacuum pan

minutes in the time required for sterilizing the canned food. And this factor, incidentally, is a reason why manual control of a retort is not satisfactory.

If an air-operated controller be used in this same retort application, more accurate control is obtained. And with such a regulator it is not necessary to disconnect the controller in bringing the retort up to temperature, because the pilot valve can be set so as not to start closing the controlling valve in the steam line until the pressure has been brought up to the control point.

But, as previously indicated, the soundest practice is to install a temperature controller where temperature is the factor to be regulated. However, in making such an installation, the piping frequently must be changed to permit the temperature controller to operate effectively. It is necessary to provide circulation of steam over the heat sensitive element, this being done by the use of an injector or bleeder on the retort.

Another, and now quite common, use of pressure controllers on canning retorts is for the protection of products packed in glass. With this type of container, any excessive variation in the retort pressure is likely to ruin a whole batch. In this process, it is necessary to maintain in the retort a pressure slightly greater than that generated inside the containers at the sterilizing temperature. If the pressure is less, the closures will be raised or blown off entirely. And if the retort pressure is too high, the closures will be "dished in." The customary practice is to maintain a pressure differential of about 10 lb.

Fig. 45 shows a retort equipped with a pressure-release valve and used with the water-cook method, the controller being the same as illustrated in Fig. 11. In this method of processing, the unoccupied space in the retort is filled with water which is heated by live steam. As the steam condenses, the air above the water is compressed, providing the pressure needed for keeping the caps in place. Or, in other systems, compressed air may be introduced into the retort to build up the pressure.

A control system that can be used on the retort when compressed air is introduced to build up the pressure is illustrated in Fig. 46. The system utilizes air-operated valves for controlling both pressure and temperature, and these controllers are combined with a time-cycle regulator and a temperature recorder to give complete automatic retort control. This system of regulators brings the temperature up and increases the pressure at the same time to prevent the caps from blowing. Then it holds the batch at the correct sterilizing temperature for the right length of time, afterward cutting off the steam, admitting cooling water at a rate which will not crack the glass containers and decreasing the pressure to prevent dishing in of the closures. This system, designed by Taylor Instrument Cos., can be used also when the containers are tin and the cooking is done in live steam, followed by pressure cooling in water. Accurate control in this case reduces the etching action and saves steam.

The function of the pressure controllers in the above retort regulating system is to admit compressed air to the retort when the pressure is too low to open the overflow valve when the pressure is too high. The duty of the temperature controller is to operate the steam supply valve, while the time-cycle controller opens the cooling-water valve when the cook is completed, at the same time shutting off the steam valve. As the cooling water flows into the retort the pressure is increased so that the overflow valve is opened and the compressed air valve closed.

MUCH HAS BEEN SAID in this article about canning-retort applications of pressure controls in combination with other regulators because these applications indicate how all the variables in a food-plant process can be placed under automatic regulation to eliminate the inaccuracies and uncertainties of manual operation. Where the volume and quality of the operations are sufficient to justify the expense of such complete controls, the savings in spoilage and fuel and the accurate duplication of results from batch to batch more than offset the cost.

Vacuum controllers are used to advantage in various concentrating and drying operations in the food processing industries. An example of this type of control application is seen in Fig. 47, where an absolute pressure control is used on a vacuum pan. The controller used in this installation is of the power-operated type, with either air or oil under pressure being controlled through a pilot valve to operate a valve located in the injection-water pipe of a jet-type condenser. The vacuum-sensitive element is an evacuated bellows inclosed

in a housing and having the vacuum of the condenser applied to it externally. This element, therefore, is responsive to variations relative to absolute pressure, the force of this pressure being balanced by a spring which is adjustable to vary the control point. This control system, a Smoot regulator, is accurate and fast-acting and is stabilized to compensate for the time lag in response to adjustment of the rate of flow of the cooling water in the condenser.

Another food-industry process where both pressure and vacuum control are sometimes used is in the rendering of fat. In Fig. 48 is shown the automatic time-pressure controller for a Laabs melter, this control system having been developed by Foxboro Co. and used in the rendering of inedible fat in foreign packing houses. A similar system has been employed for controlling the vacuum on a melter where the cooking is done under vacuum rather than under pressure. In both methods of processing, the controlling valve regulates the opening in a bypass on the fume pipe which vents to atmospheric pressure. If pressure is being controlled, it is relieved when it becomes excessive, and if vacuum is the variable under regulation, air would be admitted through the controlling valve to relieve excess vacuum. However, the principal function of this control is to maintain either the vacuum or the pressure for the required number of minutes and then release it automatically, and that is where the time-schedule controller plays its part. This system of control relieves the man operating the melter of one of his principal worries and permits him to handle a larger number of rendering units.

The controller used on the fat melter is of the air-operated type, with the controlling valve being actuated by a diaphragm, the air pressure on which is regulated by a pilot valve controlled by the pressure sensitive element (see Fig. 12).

One of the most interesting of the recent pressure- and vacuum-control installations made in a food plant is that in the factory of Diamond Crystal Salt Co., St. Clair, Mich. This company recently put into operation three new evaporating pans. To control the operation of these, four Smoot oil-operated regulators (of the types shown in Fig. 24) were installed, these regulators controlling the flow of flash steam from Alberger salt pans, to the new pans and also supplying make-up steam from a 15-lb. line as necessary. The flash steam is the vapor liberated when the brine from the Alberger pressure pans is discharged to atmospheric pressure at the inlet side of the open settling pans. This flash steam must be drawn off and the pressure kept slightly below atmospheric in order to prevent foaming in the settling pans.

The control system used is shown in Fig. 49. As indicated in the diagram, regulator No. 1 is arranged to operate a 10-in. butterfly valve in the steam-supply line from the steam-mixing chamber to the steam belt of the first-effect salt pan. The controlling diaphragm of this regulator is piped to a point in the side of the first-effect pan, and the regulator spring is loaded to maintain a vacuum of 6 in. of mercury at that point.

Regulator No. 2 is arranged to operate an 8-in. butterfly valve which will admit steam from a 15-lb. steam header to the steam mixer in case the supply of flash steam from the Alberger pans is not sufficient. The controlling diaphragm of this regulator is piped to a point in the 16-in. flash-steam line, and the regulator spring is loaded for a vacuum of 2½ in. of mercury, which means that the regulator starts opening the 8-in. makeup steam butterfly valve should a deficiency of flash steam cause the vacuum at the point where the pressure-sensitive connection is made to exceed 2½ in.

THE DIAPHRAGM of regulator No. 2 is also piped to a point in the steam mixer so that the new salt pans may be operated by using 15 lb. of steam only. In this case the stop valve will be closed and no flash steam used.

Regulator No. 3 is arranged to operate a 10-in. butterfly valve between the 16-in. flash steam line and the secondary jet condenser, the diaphragm of this regulator being connected to a point in the flash-steam line. This regulator is spring-loaded for a vacuum of 2 in. of mercury, so that if the vacuum at this point decreases due to an oversupply of flash steam, the excess steam is discharged to the sewer by way of the secondary condenser.

The fourth regulator is arranged to operate a 3-in. level-actuated valve in the water line to the condenser, the control diaphragm being piped to a point in the condenser. This regulator is spring loaded for a 6-in. vacuum so that when the steam is being discharged to the sewer, the regulator opens a water valve to maintain the desired vacuum.

One of the newest processes in the food field, the flaking of coffee, employs both automatic pressure and vacuum control. In this process the ground coffee must be tempered carefully before being passed through the high-pressure rolls which convert it to flakes. And in the tempering unit the coffee is subjected to a fine mist of water sprayed from twelve nozzles, the water being supplied to these nozzles at a pressure of 70 lb. per sq.in. Since proper tempering is vital to the flaking process, it is important that the volume of water passed through the sprays be constant, so the pressure at which it is delivered to the nozzles is regulated automatically. This is done by passing the water through an Ashcroft-American pressure regulating valve supplemented by a Hauch Manufacturing Co. micro-regulating unit which takes out even small fluctuations in pressure.

In packing the flaked coffee, a vacuum only 3 mm. short of perfect is pulled on the cans to remove the air, and then the cans are charged with carbon dioxide under a pressure of 1½ lb. per sq.in. In the vacuumizing and gasing operations, automatic regulation of the vacuum and pressure is advisable.

In vacuum packaging operations of the type used with flaked coffee, some instrument engineers advise the use of an absolute-pressure controller so as to remove the effects of variations in barometric pressure. Assume for example that a vacuum of 28 in. of mercury is drawn on a container when the barometric pressure is 29 in. Then a recording gage will show 28 in. and the absolute pressure will be 1 in. of mercury. But suppose the atmospheric pressure changes to 30 in. of mercury. Then the absolute pressure will be doubled, but the recording vacuum gage will continue to show 28 in. even though there has been a 100 per cent change in pressure in the container.

There is a vacuum-control application which can be used in processing heat-sensitive foods where the temperature of the process must be kept below that of steam at atmospheric pressure. The diagram of such a subatmospheric-pressure steam-processing apparatus is shown in Fig. 50, it being used in this case on a vacuum pan. The equipment in this system comprises a control valve for regulating the steam supply according to the vacuum or temperature, combination thermostatic and float traps, a vacuum pump capable of producing a vacuum in the heating coil of 25 in. of mercury and control for the pump, including a differential-pressure controller. The control valve may be operated in response to pressure and vacuum so that when the operator has once adjusted the valve for the desired subatmospheric pressure, it will be maintained automatically by the cooperative action of the valve with the traps, vacuum pump and differential controller. With this system, steam for processing is available at temperatures within a range of 250 deg. F. to as low as 133 deg.

In this discussion on automatic control of pressure, space limitations have not permitted every controller nor every application to be covered. But an attempt has been made to describe enough different types and enough applications to point out the variety of equipment available and suggest how it can be used. All of the equipment mentioned and much left unmentioned gives satisfactory results when properly applied to control problems, and it has not been the intention to represent the controllers made by one company as being superior to those of another.

FOOD NEWS

Flashes from **FOOD INDUSTRIES** ● THE MOST EXCITING BUSINESS IN THE WORLD ● The Foremost Paper Covering the Food Field

AMERICA'S OLDEST

In 1867, seven years before the Bank of England was founded, Anthony Morris, II, established himself in Philadelphia as a brewer and maltster. Today his firm, which now bears the name of Francis Perot's Sons Malting Company, is America's oldest business house.

It seems altogether fitting that the country's most ancient and venerable enterprise should be identified with our favorite beverage, but what strikes us as being singular is the fact that this concern has prospered so long and so well among the sober citizenry of the Quaker City.

* * *

COMING ATTRACTION

Visitors to the 1939 World's Fair will be impressed with the four food exhibits buildings. One of them will contain a "focal" exhibit tying in the story of food with the theme of the fair, "building the world of tomorrow." Another will be a circular hall 60 ft. high, broken by massive entrance pylons. The basic color will be brilliant red, relieved by red and white murals. We are wondering if any progressive, nationally known food processors will have working exhibits showing how they produce a superior product. Crowds are attracted by work being done.

* * *

A machine using electronic control has been developed for testing cans, in order to eliminate those that might leak when filled. The use of water is avoided and no operators are required to watch for leaks. The new machine will detect very fine leaks equivalent to 1 c.c. in ten seconds under 10 lb. pressure. For the details, see August *Food Industries.*

The age old problem of meat packers which resulted from their inability to make use of the "squeal" has

been solved at last. An electronic device has been evolved which utilizes squeals and squeaks to make music. As a matter of fact we think we were listening to some of this new music over the radio the other night—in between a couple of commercials.

* * *

Let us have more of this kind of sales promotion!

Lettuce growers of California and Arizona have just completed the first phase of a year's advertising campaign to increase national sales of the "green gold." Results were so surprisingly successful that a $50,000 campaign is already under way to promote melons. Next year, says the sponsor, Western Growers Protective Association, there'll be one for carrots, too.

ICE CREAM VENDOR

A vending machine recently invented promises to make ice cream available to the public in subways, theatre lobbies, office buildings, factories and at other points where ordinary means of distribution cannot be economically carried out. This machine, called the "Frost-O-Matic," delivers a cardboard wrapped 2½ oz. brick of ice cream for a nickel. With the 1 x 2 x 3 in. brick also goes a wooden spoon.—Condensed from the August FOOD INDUSTRIES.

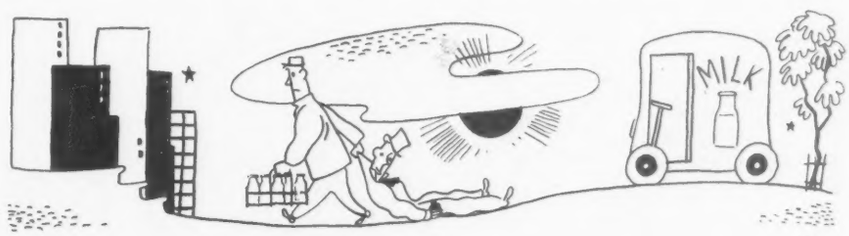
* * *

Compartment cans for the packing of different foods, which may be heated and served as a whole hot meal, have just been invented. These cans are partitioned in a cross-sectional manner and tightly sealed. . . . a key providing the means of opening.

There really ought to be a swell gag here—about brides, or novice campers, or bachelors—but for the life of us we can't seem to find the right words for it.

* * *

In Providence, during the "R" months, milkmen add oysters to their morning deliveries. New York dairymen, however, still hold the all-time record with a list of items including orange juice, eggs, cheese, milk . . . and an occasional husband.



NEW MECHANICAL WONDER STARTLES INDUSTRY

Revolutionary Machine Cuts, Grinds and Mixes in one operation

(Reported in FOOD INDUSTRIES for August)

A new piece of machinery has come on the market that performs in one operation, at high speed, what ordinarily requires three or four steps.

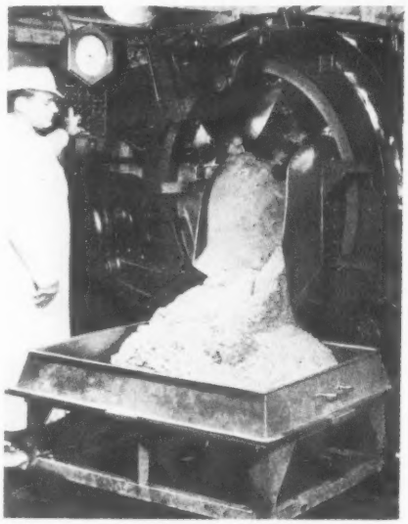
It's one of those things that you can look at for a long time and not be absolutely sure of all the things it seems capable of doing. The fact is, the machine is a production unit of very considerable capacity.

The large size will cut a 450 lb. batch of material, such as hamburger, for instance, to almost any desired fineness and mix it thoroughly in 5 to 8 minutes. As soon as the mixture has proper texture, the machine can be cleanly emptied in a fraction of a minute without stopping.

Two men operating the machine can produce from 3500 to 5000 pounds of cut and mixed food in an hour.

How it works

A 54-in. open end drum revolves at speeds of 85 to 115 revolutions per minute on a horizontal axis. This drum is about 24 in. wide and has rims projecting inward to prevent spilling.



Roto-Cut, made by Roto-Cut Machines Corp., is shown in action in a midwest plant.

FI

In the lower interior part of the drum is a movable horizontal shaft which carries 35 scimitar-like blades and revolves at a rate of 2,500 r.p.m.

FI

When the charge is ready to come out it is in a plastic or semi-fluid state, and the material flows down a chute into a waiting receptacle—usually a push truck.

FI

Since the machine performs unit operations common to several food industries, it has many possible applications. Meat Packers, Cocoa and Chocolate Manufacturers, Spice Manufacturers, Canners, Coffee Roasters, Cereal Processors, Fat and Oil Processors and Pickle Finishers should read the *Complete* story in *Food Industries* to learn of its capabilities.

FLASH!

FOOD INDUSTRIES PUBLISHES FIRST AUTHENTIC STORY ON LARGEST U.S. DAIRY PLANT

The August issue of FOOD INDUSTRIES feature the first complete and authentic story of the construction and operation of the country's largest dairy—the Riverside Plant of the Borden Farm Products Division of The Borden Company.

This story, published in the form of one of our familiar colored sections, is one of the most interesting and worthwhile supplements ever offered FOOD INDUSTRIES readers.

DON'T MISS IT!

FOOD INDUSTRIES

Look for Our Detailed Story

IN THE 1937 ABP BLUE BOOK

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new discoveries

Reported in FOOD INDUSTRIES

Accelerated ripening experiments have been made with bananas, tomatoes and other fruits in atmospheres containing *ethylene.* The effect is not merely superficial, nor is it limited to the appearance of ripening. The chemical changes which characterize the transition from green to ripe fruit are simply speeded up, so that the treated fruit actually becomes ripe more quickly.

A new automatic machine, called the "Flash" bun slitter, has been developed to split hamburger and hot dog buns in half, or leave them hinged, as desired.

According to British Patent 458,399, sweetened condensed milk can be most effectively enriched in vitamins B, C and D by incorporating them in the product separately and at different stages of the preparation and condensation. Milk powder, or preparations such as pastes or blocks, can also be made up from the vitamin-enriched condensed milk.

According to results obtained in an experimental study at a Federal Experiment Station in Switzerland, ultraviolet rays can be used successfully to improve the keeping qualities of perishable fruits and vegetables. Test specimens of tomatoes, strawberries and peaches, exposed to the ray at 4 deg. C, showed an encouraging decrease in spoilage rate.

Experts have found it difficult to discover what takes place when roasted coffee grows stale. Recent experiments, reported in the August *Food Industries* show that the coffee which is kept in a moist atmosphere soon loses its flavor, but that coffee will retain its flavor for as long as six weeks if kept in a dry place.

Every month, *Food Industries* devotes several pages to the latest news about recent "Discoveries and Inventions." Last month there were 14 of these interesting articles.